WORKBOOK CHANGE(S)

Add D 35200000.D05
Rev Date 2-3-04
F.A. Date 2-4-04
Letting Date 7-04

Move D
To Deleted File
Rev Date
F.A Date
Letting Date

Remarks New SS.

Dates

*Copy of Spec to Paul that Impacts
QPL (ONLY)
Added to Nextwb file 2-5-04
Deleted from Nextwb file
History File Updated
Rolodexed 4|22|04 ah
Additional back-up see

Route Slip

U.S. Department of Transportation
Federal Highway Administration
Florida Division
227 N. Bronough Street, Room 2015
Tallahassee, FL 32301

Distribution:
FDOT MS-75

To:	Organization:	Date:	Routing Symbol:
MR. DUANE BRAUTIGAM	FDOT, SPECIFICATIONS ENGINEER	Feb. 04, 2004	MS-75

- ☐ Per Your Request
- **xFor Your Information**
- ☐ Per Our Conversation
- ☐ Comment
- ☐ Take Appropriate Action
- ☐ Note and Return
- ☐ Discuss With Me
- ☐ For Your Approval
- ☐ For Your Signature
- ☐ Please Answer
- ☐ Prepare Reply

For Signature of

Remarks:

FLORIDA SPECIFICATIONS:

D0020000 - Supplemental Specification for Proposal Requirements and Conditions, Section 2.

D0070001.D02, for Laws to be Observed, Section 7.

D0080D16.D01, for "Bonus" Payment and Waiver of Contractor Claims, Section 8.

D3500000.D04, for Cement Concrete Pavement, Section 350.

D3520000.D03, for Grinding Concrete Pavement, Section 352.

D3530000.D03, for Concrete Pavement Slab Replacement, Section 353.

D9480044, for Pipe Liner-Machine Spiral Wound Pipe Liner, Section 948.

ATTACHMENTS

From:	Telephone Number:	FDOT MS:	Org/Rtg Symbol
By Ann Allshouse FOR: JAMES E. ST. JOHN, DIVISION ADMINISTRATOR	(850) 942-9650, EXT. 3034	# 29	

DON Davis: ANN to file in binders cc: 1 (w/specification)

Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JOSÉ ABREU
SECRETARY

February 3, 2004

Mr. Donald Davis
Program Operations Engineer
Federal Highway Administration
227 N. Bronough Street, Suite 2015
Tallahassee, Florida 32301

Re: Office of Design, Specifications
Section
Proposed Specification: D3520000.D03 – Grinding Concrete Pavement

Dear Mr. Davis:

We are submitting, for your approval, two copies of a proposed Supplemental Specification for Grinding Concrete Pavement.

This change was proposed by Charles Ishee of the State Materials Office to establish minimum size criteria for the equipment.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to SP965DB or duane.brautigam@dot.state.fl.us.

If you have any questions relating to this specification change, please call Duane F. Brautigam, State Specifications Engineer at 414-4110.

Sincerely,

Duane F. Brautigam, P.E.
State Specifications Engineer

DFB/sh
Attachment
cc: General Counsel
Florida Transportation Builders' Assoc.
State Construction Engineer

GRINDING CONCRETE PAVEMENT.
(REV 2-3-04)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind Portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Identify all equipment for grinding concrete pavement in the Quality Control Plan (QCP) as required in Section 105. Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. The equipment will be of a size that can cut or plane at least 3 feet [1 m] wide or as approved by the Engineer. Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations. The equipment will be capable of removing any slurry or residue resulting from the grinding operation.

352-3 Construction Methods.

Grind the areas of pavement surfaces designated on the plans. Do not grind roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. Grind in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Take all necessary precautions to minimize the number of minor depressions in the first place and only resolve to grind such areas if necessary. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval for a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface

Deleted: 5-13-03
Deleted: 9-19-03
Deleted: 10-29-03
Deleted: 1-15-04
Inserted: 9-19-03
Inserted: 10-29-03
Inserted: 1-15-04
Deleted: existing portland
Formatted
Deleted: three
Deleted: in the Quality Control Plan
Deleted: existing
Deleted: bridge decks and
Deleted: Accomplish g
Deleted: ing
Deleted: Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions.
Deleted: of
Deleted: In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil.

finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for smoothness with either a 10 foot [3 m] long straightedge, a 10 foot [3 m] long rolling straightedge, or a California Type Profilograph while the Engineer observes the operations. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3 m] straightedge. When portland cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot [3 m] length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3 m] rolling straightedge: Use this straightedge for longitudinal profiling of short pavement sections up to 250 feet [75 m] long, including mainline and non-mainline sections on tangent sections and on horizontal curves with a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot [3 m] length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

Deleted: linear
Inserted: linear
Deleted: linear
Inserted: linear
Deleted: pavement surface
Deleted: using
Deleted: .048
Deleted: .048
Deleted: .048
Deleted: .048
Deleted: .048
Deleted: of mainline pavement lanes
Deleted: pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed
Deleted: .048

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device in accordance with FM 5-558E. The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface meeting the requirements of FM 5-558E and having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Deleted: .¶
. . . . Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is

Deleted: compliance

Deleted: Florida Method of Test

Deleted: for a California Type Profilograph (Electronic Model)

Deleted: ¶
. . . .

Deleted: .048

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved. Replace any area of concrete pavement with concrete that meets the requirements of Sections 353 or 354.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete. If the grinding operation removes more than a total length of 100 consecutive feet [30 M] of the grooves, then re-groove the entire width of the pavement for the deficient area.

Deleted: . Produce, by grinding, a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Ensure that the peaks of ridges are approximately 1/32 inch [0.8 mm] higher than the bottoms of the grooves with approximately 60 evenly spaced grooves per foot [300 mm].¶

Deleted: . Saw the area to be removed to a smooth vertical surface. Clean the face of the adjacent (hardened) concrete, and coat it with an epoxy bonding compound before placing the replacement concrete.¶

352-7 Method of Measurement.

Deleted: 5

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-8 Basis of Payment.

Deleted: 6

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

Deleted: SI Units ... [1]

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥ 600 m	300 m ≤ Curvature Radius < 600 m	
PI < 30	PI < 65	103
30 < PI < 80	65 < PI < 110	100
PI > 80	PI > 110	Corrective work required

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.
Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

GRINDING CONCRETE PAVEMENT.
(REV 2-3-04)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind Portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Identify all equipment for grinding concrete pavement in the Quality Control Plan (QCP) as required in Section 105. Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. The equipment will be of a size that can cut or plane at least 3 feet [1 m] wide or as approved by the Engineer. Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations. The equipment will be capable of removing any slurry or residue resulting from the grinding operation.

352-3 Construction Methods.

Grind the areas of pavement surfaces designated on the plans. Do not grind roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. Grind in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Take all necessary precautions to minimize the number of minor depressions in the first place and only resolve to grind such areas if necessary. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval for a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface

finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for smoothness with either a 10 foot [3 m] long straightedge, a 10 foot [3 m] long rolling straightedge, or a California Type Profilograph while the Engineer observes the operations. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3 m] straightedge. When portland cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot [3 m] length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3 m] rolling straightedge: Use this straightedge for longitudinal profiling of short pavement sections up to 250 feet [75 m] long, including mainline and non-mainline sections on tangent sections and on horizontal curves with a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot [3 m] length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device in accordance with FM 5-558E. The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface meeting the requirements of FM 5-558E and having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved. Replace any area of concrete pavement with concrete that meets the requirements of Sections 353 or 354.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete. If the grinding operation removes more than a total length of 100 consecutive feet [30 M] of the grooves, then re-groove the entire width of the pavement for the deficient area.

352-7 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-8 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	Percent of Pavement Unit Bid Price
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥ 600 m	300 m ≤ Curvature Radius < 600 m	
PI ≤ 30	PI ≤ 65	103
30 < PI ≤ 80	65 < PI ≤ 110	100
PI > 80	PI > 110	Corrective work required

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.
Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

SI Units	
PI = 80 mm/km	PI = 110 mm/km
PI ≤ 30	PI ≤ 65
30 < PI ≤ 80	65 < PI ≤ 110
PI > 80	PI > 110

APPROVED: DATE: 2-04-04
For the Division Administrator

Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JOSÉ ABREU
SECRETARY

February 3, 2004

Mr. Donald Davis
Program Operations Engineer
Federal Highway Administration
227 N. Bronough Street, Suite 2015
Tallahassee, Florida 32301

Re: Office of Design, Specifications
Section
Proposed Specification: D3520000.D03 – Grinding Concrete Pavement

Dear Mr. Davis:

We are submitting, for your approval, two copies of a proposed Supplemental Specification for Grinding Concrete Pavement.

This change was proposed by Charles Ishee of the State Materials Office to establish minimum size criteria for the equipment.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to SP965DB or duane.brautigam@dot.state.fl.us.

If you have any questions relating to this specification change, please call Duane F. Brautigam, State Specifications Engineer at 414-4110.

Sincerely,

Duane F. Brautigam, P.E.
State Specifications Engineer

DFB/sh
Attachment
cc: General Counsel
Florida Transportation Builders' Assoc.
State Construction Engineer

GRINDING CONCRETE PAVEMENT.
(REV ~~5-13-039-19-0310-29-031-15-042-3-04~~)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind ~~existing portland~~ *Portland* cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Identify all equipment for grinding concrete pavement in the Quality Control Plan (QCP) as required in Section 105. Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least ~~three~~3 feet [1 m] wide or as approved ~~in the Quality Control Plan~~by the Engineer.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations. *The equipment will be capable of removing any slurry or residue resulting from the grinding operation.*

352-3 Construction Methods.

Grind the areas of ~~existing~~ pavement surfaces designated on the plans. Do not grind ~~bridge decks and~~ roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. ~~Accomplish g~~Grind~~ing~~ in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. *Take all necessary precautions to minimize the number of minor depressions in the first place and only resolve to grind such areas if necessary.* ~~Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions.~~ Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval ~~of~~ *for* a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. ~~In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil.~~ Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per ~~*linear*~~ foot [200 per ~~*linear*~~ meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for ~~pavement surface~~ smoothness ~~using~~ *with* either a 10 foot [3~~.048~~ m] long straightedge, a 10 foot [3~~.048~~ m] long rolling straightedge, or a California Type Profilograph *while the Engineer observes the operations.* For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3~~.048~~ m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3~~.048~~ m] straightedge. When *portland* cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot *[3 m]* length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3~~.048~~ m] rolling straightedge: Use this straightedge for longitudinal profiling of short *pavement* sections ~~of mainline pavement lanes~~ up to 250 feet [75 m] long, ~~pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed~~*including mainline and non-mainline sections on tangent sections and on horizontal curves with a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.*

Furnish and operate the straightedge. Provide and operate a 10 foot [3~~.048~~ m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot *[3 m]* length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of

roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device~~:~~

~~Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is~~ in ~~compliance~~*accordance* with ~~Florida Method of Test~~ FM 5-558E ~~for a California Type Profilograph (Electronic Model)~~.

~~The~~ The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface *meeting the requirements of FM 5-558E and* having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3~~.048~~ m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

~~*Produce, by grinding, a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Ensure that the peaks of ridges are approximately 1/32 inch [0.8 mm] higher than the bottoms of the grooves with approximately 60 evenly spaced grooves per foot [300 mm].*~~

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved. Replace any area of concrete pavement with concrete that meets the requirements of Sections 353 or 354.

~~*Saw the area to be removed to a smooth vertical surface. Clean the face of the adjacent (hardened) concrete, and coat it with an epoxy bonding compound before placing the replacement concrete.*~~

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete. If the grinding operation removes more than a total length of 100 consecutive feet [30 M] of the grooves, then re-groove the entire width of the pavement for the deficient area.

352-~~5~~*7* Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-~~6~~*8* Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

~~SI Units~~	
~~PI = 80 mm/km~~	~~PI = 110 mm/km~~
~~PI ≤ 30~~	~~PI ≤ 65~~
~~30 < PI ≤ 80~~	~~65 < PI ≤ 110~~
~~PI > 80~~	~~PI > 110~~

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		*Contract Unit Price Adjustments Percent of Pavement Unit Bid Price*
Curvature Radius ≥ 600 m	*300 m ≤ Curvature Radius < 600 m*	
PI ≤ 30	*PI ≤ 65*	*103*
30 < PI ≤ 80	*65 < PI ≤ 110*	*100*
PI > 80	*PI > 110*	*Corrective work required*

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.

Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

GRINDING CONCRETE PAVEMENT.
(REV 2-3-04)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind Portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Identify all equipment for grinding concrete pavement in the Quality Control Plan (QCP) as required in Section 105. Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. The equipment will be of a size that can cut or plane at least 3 feet [1 m] wide or as approved by the Engineer. Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations. The equipment will be capable of removing any slurry or residue resulting from the grinding operation.

352-3 Construction Methods.

Grind the areas of pavement surfaces designated on the plans. Do not grind roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. Grind in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Take all necessary precautions to minimize the number of minor depressions in the first place and only resolve to grind such areas if necessary. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval for a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface

finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for smoothness with either a 10 foot [3 m] long straightedge, a 10 foot [3 m] long rolling straightedge, or a California Type Profilograph while the Engineer observes the operations. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3 m] straightedge. When portland cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot [3 m] length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3 m] rolling straightedge: Use this straightedge for longitudinal profiling of short pavement sections up to 250 feet [75 m] long, including mainline and non-mainline sections on tangent sections and on horizontal curves with a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot [3 m] length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device in accordance with FM 5-558E. The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface meeting the requirements of FM 5-558E and having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved. Replace any area of concrete pavement with concrete that meets the requirements of Sections 353 or 354.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete. If the grinding operation removes more than a total length of 100 consecutive feet [30 M] of the grooves, then re-groove the entire width of the pavement for the deficient area.

352-7 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-8 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥ 600 m	300 m ≤ Curvature Radius < 600 m	
PI ≤ 30	PI ≤ 65	103
30 < PI ≤ 80	65 < PI ≤ 110	100
PI > 80	PI > 110	Corrective work required

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.
Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

John H Owens

02/03/2004 04:59 PM

To: Duane F Brautigam/CO/FDOT@FDOT, Charles A Ishee/SM/FDOT@FDOT, Michael Bergin/SM/FDOT@FDOT
cc: Clinton Shaw/CO/FDOT@FDOT, Judy F Frazier/CO/FDOT@FDOT, Shirley Harvey/CO/FDOT@FDOT
Subject: FW: D3500000.D04 - Cement Concrete Pavement, D3520000.D03 ? Grinding Concrete Pavement and D3530000.D03- Concrete Pavement Slab Replacement

F.Y.I.

Thank You, Have A Great Day,

John H. Owens

F.D.O.T. Specifications Office

(850) 414-4113 Fax (850) 413-7385

E-Mail: john.owens@dot.state.fl.us

----- Forwarded by John H Owens/CO/FDOT on 02/03/2004 04:58 PM -----

"Schiess, Greg" <Greg.Schiess@fhwa.dot.gov>

02/03/2004 04:40 PM

To: "Davis, Donald" <Donald.Davis@fhwa.dot.gov>, "Allshouse, Ann" <Ann.Allshouse@fhwa.dot.gov>
cc: <john.owens@dot.state.fl.us>
Subject: FW: D3500000.D04 - Cement Concrete Pavement, D3520000.D03 ? Grinding Concrete Pavement and D3530000.D03- Concrete Pavement Slab Replacement

These specs are approved as submitted

-----Original Message-----
From: john.owens@dot.state.fl.us [mailto:john.owens@dot.state.fl.us]
Sent: Tuesday, February 03, 2004 4:26 PM
To: Allshouse, Ann; bburleson@ftba.com; clay.mcgonagill@dot.state.fl.us; david.sadler@dot.state.fl.us; Davis, Donald
Cc: charles.ishee@dot.state.fl.us; michael.bergin@dot.state.fl.us; david.sadler@dot.state.fl.us; duane.brautigam@dot.state.fl.us
Subject: Re: D3500000.D04 - Cement Concrete Pavement, D3520000.D03 ? Grinding Concrete Pavement and D3530000.D03- Concrete Pavement Slab Replacement

Good afternoon Mr. Davis, please find attached the subject proposed Supplemental Specifications for review and approval.

(See attached file: D3500000.D04.doc)(See attached file: D3520000.D03.doc)
(See attached file: D3530000.D03.doc)

Thank You, Have A Great Day,
John H. Owens
F.D.O.T. Specifications Office
(850) 414-4113 Fax (850) 413-7385
E-Mail: john.owens@dot.state.fl.us
(Embedded image moved to file: pic29972.gif)


D3500000.D04.doc


D3520000.D03.doc


D3530000.D03.doc


pic29972.gif

Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JOSÉ ABREU
SECRETARY

February 3, 2004

Mr. Donald Davis
Program Operations Engineer
Federal Highway Administration
227 N. Bronough Street, Suite 2015
Tallahassee, Florida 32301

Re: Office of Design, Specifications
Section
Proposed Specification: D3520000.D03 – Grinding Concrete Pavement

Dear Mr. Davis:

We are submitting, for your approval, two copies of a proposed Supplemental Specification for Grinding Concrete Pavement.

This change was proposed by Charles Ishee of the State Materials Office to establish minimum size criteria for the equipment.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to SP965DB or duane.brautigam@dot.state.fl.us.

If you have any questions relating to this specification change, please call Duane F. Brautigam, State Specifications Engineer at 414-4110.

Sincerely,

Duane F. Brautigam, P.E.
State Specifications Engineer

DFB/sh
Attachment
cc: General Counsel
Florida Transportation Builders' Assoc.
State Construction Engineer

GRINDING CONCRETE PAVEMENT.
(REV ~~5-13-03~~ *~~9-19-03~~ 10-29-03 1-15-04-3-04*)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind ~~existing portland~~ *Portland* cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Identify all equipment for grinding concrete pavement in the Quality Control Plan (QCP) as required in Section 105. Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least ~~three~~3 feet [1 m] wide or as approved ~~in the Quality Control Plan~~by the Engineer.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations. *The equipment will be capable of removing any slurry or residue resulting from the grinding operation.*

352-3 Construction Methods.

Grind the areas of ~~existing~~ pavement surfaces designated on the plans. Do not grind ~~bridge decks and~~ roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. ~~Accomplish g~~Grind~~ing~~ in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. *Take all necessary precautions to minimize the number of minor depressions in the first place and only resolve to grind such areas if necessary.* ~~Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions.~~ Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval ~~of~~ *for* a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. ~~In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil.~~ Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per ~~*linear*~~ foot [200 per ~~*linear*~~ meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for ~~pavement surface~~ smoothness ~~using~~ *with* either a 10 foot [3~~.048~~ m] long straightedge, a 10 foot [3~~.048~~ m] long rolling straightedge, or a California Type Profilograph *while the Engineer observes the operations*. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3~~.048~~ m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3~~.048~~ m] straightedge. When *portland* cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot *[3 m]* length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3~~.048~~ m] rolling straightedge: Use this straightedge for longitudinal profiling of short *pavement* sections ~~of mainline pavement lanes~~ up to 250 feet [75 m] long, ~~pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed~~*including mainline and non-mainline sections on tangent sections and on horizontal curves with a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.*

Furnish and operate the straightedge. Provide and operate a 10 foot [3~~.048~~ m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot *[3 m]* length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of

roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device~~:~~

~~Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is~~ in ~~compliance~~*accordance* with ~~Florida Method of Test~~ FM 5-558E ~~for a California Type Profilograph (Electronic Model)~~.

~~The electronic model of a California Type Profilograph performs~~ computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface *meeting the requirements of FM 5-558E and* having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3~~.048~~ m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

~~*Produce, by grinding, a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Ensure that the peaks of ridges are approximately 1/32 inch [0.8 mm] higher than the bottoms of the grooves with approximately 60 evenly spaced grooves per foot [300 mm].*~~

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved. Replace any area of concrete pavement with concrete that meets the requirements of Sections 353 or 354.

~~*Saw the area to be removed to a smooth vertical surface. Clean the face of the adjacent (hardened) concrete, and coat it with an epoxy bonding compound before placing the replacement concrete.*~~

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete. If the grinding operation removes more than a total length of 100 consecutive feet [30 M] of the grooves, then re-groove the entire width of the pavement for the deficient area.

352-~~5~~*7* Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-~~6~~*8* Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

~~SI Units~~	
~~PI = 80 mm/km~~	~~PI = 110 mm/km~~
~~PI ≤ 30~~	~~PI ≤ 65~~
~~30 < PI ≤ 80~~	~~65 < PI ≤ 110~~
~~PI > 80~~	~~PI > 110~~

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		*Contract Unit Price Adjustments Percent of Pavement Unit Bid Price*
Curvature Radius ≥ 600 m	*300 m ≤ Curvature Radius < 600 m*	
PI ≤ 30	*PI ≤ 65*	*103*
30 < PI ≤ 80	*65 < PI ≤ 110*	*100*
PI > 80	*PI > 110*	*Corrective work required*

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.

Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

GRINDING CONCRETE PAVEMENT.
(REV 2-3-04)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind Portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Identify all equipment for grinding concrete pavement in the Quality Control Plan (QCP) as required in Section 105. Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. The equipment will be of a size that can cut or plane at least 3 feet [1 m] wide or as approved by the Engineer. Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations. The equipment will be capable of removing any slurry or residue resulting from the grinding operation.

352-3 Construction Methods.

Grind the areas of pavement surfaces designated on the plans. Do not grind roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. Grind in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Take all necessary precautions to minimize the number of minor depressions in the first place and only resolve to grind such areas if necessary. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval for a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface

finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for smoothness with either a 10 foot [3 m] long straightedge, a 10 foot [3 m] long rolling straightedge, or a California Type Profilograph while the Engineer observes the operations. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3 m] straightedge. When portland cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot [3 m] length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3 m] rolling straightedge: Use this straightedge for longitudinal profiling of short pavement sections up to 250 feet [75 m] long, including mainline and non-mainline sections on tangent sections and on horizontal curves with a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot [3 m] length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device in accordance with FM 5-558E. The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface meeting the requirements of FM 5-558E and having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved. Replace any area of concrete pavement with concrete that meets the requirements of Sections 353 or 354.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete. If the grinding operation removes more than a total length of 100 consecutive feet [30 M] of the grooves, then re-groove the entire width of the pavement for the deficient area.

352-7 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-8 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥ 600 m	300 m ≤ Curvature Radius < 600 m	
PI ≤ 30	PI ≤ 65	103
30 < PI ≤ 80	65 < PI ≤ 110	100
PI > 80	PI > 110	Corrective work required

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.
Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

John H Owens
02/03/2004 12:41 PM

To: Judy F Frazier/CO/FDOT@FDOT, Shirley Harvey/CO/FDOT@FDOT
cc:
Subject: Re: Greg Schiess comments on Sections 350, 352, 353 and 354.

Duane said to make the changes Charles has in the attached file and get them ready to send back to FHWA.

Thank You, Have A Great Day,

John H. Owens

F.D.O.T. Specifications Office

(850) 414-4113 Fax (850) 413-7385

E-Mail: john.owens@dot.state.fl.us

----- Forwarded by John H Owens/CO/FDOT on 02/03/2004 12:39 PM -----

Charles A Ishee
02/03/2004 12:23 PM

To: Greg.Schiess@fhwa.dot.gov
cc: (bcc: John H Owens/CO/FDOT)
Subject: Re: Greg Schiess comments on Sections 350, 352, 353 and 354.

Mr. Schiess:

Sorry I didn't get this back to you sooner, but I was in meetings all day yesterday. Here are the answer to the questions we discussed earlier in blue. I will try to call you right after lunch to see if you have any additional comments or questions. Thanks =)

D3500000 (new).D03.do D3520000 (new).D02.do D3530000 (new).D02.do fm5-558.pdf

----- Forwarded by Duane F Brautigam/CO/FDOT on 02/02/2004 08:58 AM -----

"Schiess, Greg" <Greg.Schiess@fhwa.dot.gov>
01/30/2004 01:37 PM

To: <DUANE.BRAUTIGAM@DOT.STATE.FL.US>
cc:
Subject: DB 013004.doc

To: Mr. D. Brautigam

From: G Schiess

Subject: Spec Review

Date: 30-Jan-04

I have the following comments on these specifications: 354, 350, 352, and 353.

350 - There are numerous comments and these were discussed with Charles Ishee at the DME

meeting this week. Charles agreed to make the changes.

In section 350-1, a second paragraph is added to include "If any uncontrolled cracks appear during the life of the contract that is unacceptable to the Engineer, remove and replace any area at no expense to the Department. Investigate and implement immediate effective solutions to eliminate further cracks, in consultation with, and subject to the approval of, the Engineer."

In section 350-3.2 (last sentence) is changed to "Automatic grade controls are not allowed on the paver when the tracks of the slip-form paver are operating on previously placed concrete pavement. "

In section 350-3.7 is removed because grinding is now required and no tining is needed.

In section 350-12.3.2 (third paragraph) is changed to "Accomplish the joint sawing in two steps. Make the initial cut 1/8 inch [3 mm] wide by a depth at least 1/3 of the pavement thickness and as soon as possible but in no case longer than 12 hours after placing the concrete. Make a second saw cut, to provide the joint dimensions indicated in the plans, just prior to installing the load transfer device."

In section 14.1.2, Greg was going to look and see if any other state was using the Impact Echo for pavement thickness and use similar wording.

In section 350-16 (first paragraph) is changed to "Construct an earth berm along each edge of the pavement after the concrete is 3 days old or less than 7 days old. "

354 - Delete as standard specification and make as a technical special provision only

Section 354 – 1 .....Second sentence should be eliminated and placed in 350, if it isn't already there. **Agree**

Section 354-3..... Partial depth repairs are no longer allowed by the Department, (the performance has been horrible even when done right). Need section rewritten accordingly

.....Also in the development of the PCC warranty spec agreement was reached that the defective area (in the wheel path) that can be filled with silicone is when the width is 1" or less (can be left in place). Suggests this spec read the same.

352

Need to address "What" the calibration will consists of and reference that in the specification. Also need to require the calibration to be observed by the Engineer

The methods described in this section is for the contractor to perform quality control testing on the pavement. The final acceptance (section 355) will be performed by the Department.

Section 352-6 .....need to establish the maximum area, or wheel path length, that the longitudinal grooves can be ground out to correct a bump or improve the ride before the area has to be re-grooved.

The minimum wheel path length that can be evaluated by the pavement evaluation skid vehicles is 100-feet. Since this is the minimum amount that can be evaluated for skid safety, this is the length that will be included in the specification. Add sentence to the end of the section to read "If the grinding operation removes more than a total length of 100 consecutive feet [30 M] of the grooves,

then re-groove the entire width of the pavement for the deficient area."

Section 352-7.....Need the plans prep manual to tell designers to add this pay item to all pcc jobs.....or.....if the grinding is to be included in the cost of the pcc, reword this section accordingly.

The plans prep manual needs to designate so that any project that has pcc pay item will also have grinding pay item as well. This is because some of the slab replacement projects may or may not need grinding depending on the condition of the roadway. Memo will be sent to Brian Blanchard on this issue.

353

Not sure why 346 isn't referenced for materials and the concrete called something like "Special Class I" . Since the acceptance and verification samples are referenced in the spec we need a frequency for S&T,...and since this spec doesn't cal the concrete mix a paving class I the how does 346 control??

Agree. Section 353-2 needs to be updated to include "Concrete will meet the requirements of Section 346 (Class I Paving) with the changes described in this section."

..... Also is the 750 psi tolerance right for 24 hour breaks ????

This will now be addressed with the sentence added above.

Section 353-6 .. Third sentence...why is the phase "unacceptable to the Engineer," here. If the slab cracks replace it.

Agree. The sentence now reads "If any uncontrolled cracks appear during the life of the contract, remove and replace the cracked slab at no expense to the Department."

Will all slab replacement jobs include grinding the finished surface?? If not the spec should address the straight edging.

Not all slab replacement jobs will require grinding the finished surface. If it is a major job it should include grinding the entire roadway, but a minor job may not need grinding if the ride of the road is acceptable. Wording is added to the third paragraph in 353-7 as follows, "Perform straight edging while the concrete is still in plastic state after floating is completed and the water sheen has disappeared. Furnish and operate a 10 foot [3 m] straightedge meeting the requirements of 350-3.6. Hold the straightedge in successive positions parallel to the road centerline, in contact with the surface, testing until the replacement slab is straight edged from one side to the other. Advance along the road in successive stages of not more than one-half the length of the straightedge. Fill any depressions immediately with freshly mixed concrete, strike-off, consolidate and refinish. Cut down and refinish any high areas. Continue straightedge testing and surface correction until the entire surface conforms to the required grade and cross section. Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline. When Portland cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot [3 m] length. Produce a uniform, gritty textured final finish longitudinally along the pavement by dragging a broom or seamless strip of damp burlap, having at least 3 feet [1 m] in contact with the pavement."

Charles A. Ishee, P.E.

Structural Materials Research Engineer
T: 352-955-6668 (SC 625-6668)
C: 352-339-2376
E: charles.ishee@dot.state.fl.us

Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JOSÉ ABREU
SECRETARY

January 16, 2004

Mr. Donald Davis
Program Operations Engineer
Federal Highway Administration
227 N. Bronough Street, Suite 2015
Tallahassee, Florida 32301

Re: Office of Design, Specifications
Section 352
Proposed Specification: D3520000.D02 – Grinding Concrete Pavement

Dear Mr. Davis:

We are submitting, for your approval, two copies of a proposed Supplemental Specification for Grinding Concrete Pavement.

This change was proposed by Charles Ishee of the State Materials Office to establish minimum size criteria for the equipment.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to SP965DB or duane.brautigam@dot.state.fl.us.

If you have any questions relating to this specification change, please call Duane F. Brautigam, State Specifications Engineer at 414-4110.

Sincerely,

Duane F. Brautigam, P.E.
State Specifications Engineer

DFB/sh
Attachment
cc: General Counsel
Florida Transportation Builders' Assoc.
State Construction Engineer

GRINDING CONCRETE PAVEMENT.
(REV ~~5-13-039-19-0310-29-031-15-04~~)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind ~~existing portland~~ *Portland* cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Identify all equipment for grinding concrete pavement in the Quality Control Plan (QCP) as required in Section 105. Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least ~~three~~3 feet [1 m] wide or as approved ~~in the Quality Control Plan~~by the Engineer.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations. *The equipment will be capable of removing any slurry or residue resulting from the grinding operation.*

352-3 Construction Methods.

Grind the areas of ~~existing~~ pavement surfaces designated on the plans. Do not grind ~~bridge decks and~~ roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. ~~Accomplish g~~Grind~~ing~~ in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. *Take all necessary precautions to minimize the number of minor depressions in the first place and only resolve to grind such areas if necessary.* ~~Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions.~~ Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval ~~of~~ *for* a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. ~~In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil.~~ Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per ~~*linear*~~ foot [200 per ~~*linear*~~ meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for ~~pavement surface~~ smoothness ~~using~~ *with* either a 10 foot [3~~.048~~ m] long straightedge, a 10 foot [3~~.048~~ m] long rolling straightedge, or a California Type Profilograph *while the Engineer observes the operations*. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3~~.048~~ m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3~~.048~~ m] straightedge. When *portland* cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot *[3 m]* length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3~~.048~~ m] rolling straightedge: Use this straightedge for longitudinal profiling of short *pavement* sections ~~of mainline pavement lanes~~ up to 250 feet [75 m] long, ~~pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed~~*including mainline and non-mainline sections on tangent sections and on horizontal curves with a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.*

Furnish and operate the straightedge. Provide and operate a 10 foot [3~~.048~~ m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot *[3 m]* length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device.

~~Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is~~ in ~~compliance~~*accordance* with ~~Florida Method of Test~~ FM 5-558E ~~for a California Type Profilograph (Electronic Model)~~.

~~The~~ The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface *meeting the requirements of FM 5-558E and* having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3~~.048~~ m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent

sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

~~*Produce, by grinding, a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Ensure that the peaks of ridges are approximately 1/32 inch [0.8 mm] higher than the bottoms of the grooves with approximately 60 evenly spaced grooves per foot [300 mm].*~~

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved. Replace any area of concrete pavement with concrete that meets the requirements of Sections 353 or 354.

~~*Saw the area to be removed to a smooth vertical surface. Clean the face of the adjacent (hardened) concrete, and coat it with an epoxy bonding compound before placing the replacement concrete.*~~

*Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete. **If the grinding operation removes more than a total length of 100 consecutive feet [30 M] of the grooves, then re-groove the entire width of the pavement for the deficient area.***

352-~~5~~*7* Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-~~6~~*8* Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

~~SI Units~~	
~~PI = 80 mm/km~~	~~PI = 110 mm/km~~
~~PI ≤ 30~~	~~PI ≤ 65~~
~~30 < PI ≤ 80~~	~~65 < PI ≤ 110~~
~~PI > 80~~	~~PI > 110~~

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		*Contract Unit Price Adjustments Percent of Pavement Unit Bid Price*
Curvature Radius ≥ 600 m	*300 m ≤ Curvature Radius < 600 m*	
PI ≤ 30	*PI ≤ 65*	*103*
30 < PI ≤ 80	*65 < PI ≤ 110*	*100*
PI > 80	*PI > 110*	*Corrective work required*

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.
Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

GRINDING CONCRETE PAVEMENT.
(REV 1-15-04)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind Portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Identify all equipment for grinding concrete pavement in the Quality Control Plan (QCP) as required in Section 105. Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. The equipment will be of a size that can cut or plane at least 3 feet [1 m] wide or as approved by the Engineer. Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations. The equipment will be capable of removing any slurry or residue resulting from the grinding operation.

352-3 Construction Methods.

Grind the areas of pavement surfaces designated on the plans. Do not grind roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. Grind in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Take all necessary precautions to minimize the number of minor depressions in the first place and only resolve to grind such areas if necessary. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval for a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface

finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for smoothness with either a 10 foot [3 m] long straightedge, a 10 foot [3 m] long rolling straightedge, or a California Type Profilograph while the Engineer observes the operations. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3 m] straightedge. When portland cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot [3 m] length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3 m] rolling straightedge: Use this straightedge for longitudinal profiling of short pavement sections up to 250 feet [75 m] long, including mainline and non-mainline sections on tangent sections and on horizontal curves with a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot [3 m] length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device in accordance with FM 5-558E. The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface meeting the requirements of FM 5-558E and having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved. Replace any area of concrete pavement with concrete that meets the requirements of Sections 353 or 354.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete.

352-7 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-8 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥ 600 m	300 m ≤ Curvature Radius < 600 m	
PI ≤ 30	PI ≤ 65	103
30 < PI ≤ 80	65 < PI ≤ 110	100
PI > 80	PI > 110	Corrective work required

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.
Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

John H Owens

02/02/2004 10:02 AM

To: Charles A Ishee/SM/FDOT@FDOT
cc: Michael Bergin/SM/FDOT@FDOT, Duane F Brautigam/CO/FDOT@FDOT, (bcc: Shirley Harvey/CO/FDOT)
Subject: Re: Greg Schiess comments on Sections 350, 352, 353 and 354.

Good morning Charles, here we go again. Please review and respond to the comments below submitted by Greg Schiess. Also, please note that we need answers today, as we are holding the July 2004 work book to incorporate these revised Specifications into this work book.
If these comments cannot be resolved promptly, the revised Specifications will not be implementation with the July 2004 work book and we will try for a January 2005 implementation date.

Thank You, Have A Great Day,

John H. Owens

F.D.O.T. Specifications Office

(850) 414-4113 Fax (850) 413-7385

E-Mail: john.owens@dot.state.fl.us

----- Forwarded by John H Owens/CO/FDOT on 02/02/2004 09:50 AM -----

Duane F Brautigam

02/02/2004 09:02 AM

To: Clinton Shaw/CO/FDOT@FDOT, Juanita Moore/CO/FDOT@FDOT, Shirley Harvey/CO/FDOT@FDOT, John H Owens/CO/FDOT@FDOT
cc:
Subject: DB 013004.doc

Please look at these comments from Greg Schiess ASAP. Where do we stand with these concrete pavement specs? Are we holding the workbook for this package?

Please get together and let me know today, if possible, where we are on the entire package.

Thanks - DFB

Duane F. Brautigam, P.E.
State Specifications Engineer
Florida Department of Transportation
(850) 414-4130; SC 994-4130
duane.brautigam@dot.state.fl.us

----- Forwarded by Duane F Brautigam/CO/FDOT on 02/02/2004 08:58 AM -----

"Schiess, Greg" <Greg.Schiess@fhwa.dot.gov>

01/30/2004 01:37 PM

To: <DUANE.BRAUTIGAM@DOT.STATE.FL.US>
cc:
Subject: DB 013004.doc

To: Mr. D. Brautigam

From: G Schiess

Subject: Spec Review

Date: 30-Jan-04

I have the following comments on these specifications: 354, 350, 352, and 353.

350 - There are numerous comments and these were discussed with Charles Ishee at the DME meeting this week. Charles agreed to make the changes.

354

Section 354 – 1 .....Second sentence should be eliminated and placed in 350, if it isn't already there.

Section 354-3..... Partial depth repairs are no longer allowed by the Department, (the performance has been horrible even when done right). Need section rewritten accordingly

.....Also in the development of the PCC warranty spec agreement was reached that the defective area (in the wheel path) that can be filled with silicone is when the width is 1" or less (can be left in place). Suggests this spec read the same.

352

Need to address "What" the calibration will consists of and reference that in the specification. Also need to require the calibration to be observed by the Engineer

Section 352-6 .....need to establish the maximum area, or wheel path length, that the longitudinal grooves can be ground out to correct a bump or improve the ride before the area has to be re-grooved.

Section 352-7.....Need the plans prep manual to tell designers to add this pay item to all pcc jobs.....or.....if the grinding is to be included in the cost of the pcc, reword this section accordingly.

353

Not sure why 346 isn't referenced for materials and the concrete called something like "Special Class I" . Since the acceptance and verification samples are referenced in the spec we need a frequency for S&T,...and since this spec doesn't cal the concrete mix a paving class I the how does 346 control??

..... Also is the 750 psi tolerance right for 24 hour breaks ????

Section 353-6 .. Third sentence...why is the phase "unacceptable to the Engineer," here. If the slab cracks replace it.

Will all slab replacement jobs include grinding the finished surface?? If not the spec should address the straight edging.

Duane F Brautigam

02/02/2004 09:02 AM

To: Clinton Shaw/CO/FDOT@FDOT, Juanita Moore/CO/FDOT@FDOT, Shirley Harvey/CO/FDOT@FDOT, John H Owens/CO/FDOT@FDOT
cc:
Subject: DB 013004.doc

Please look at these comments from Greg Schiess ASAP. Where do we stand with these concrete pavement specs? Are we holding the workbook for this package?

Please get together and let me know today, if possible, where we are on the entire package.

Thanks - DFB

Duane F. Brautigam, P.E.
State Specifications Engineer
Florida Department of Transportation
(850) 414-4130; SC 994-4130
duane.brautigam@dot.state.fl.us
----- Forwarded by Duane F Brautigam/CO/FDOT on 02/02/2004 08:58 AM -----

"Schiess, Greg" <Greg.Schiess@fhwa.dot.gov>

01/30/2004 01:37 PM

To: <DUANE.BRAUTIGAM@DOT.STATE.FL.US>
cc:
Subject: DB 013004.doc

To: Mr. D. Brautigam

From: G Schiess

Subject: Spec Review

Date: 30-Jan-04

I have the following comments on these specifications: 354, 350, 352, and 353.

350 - There are numerous comments and these were discussed with Charles Ishee at the DME meeting this week. Charles agreed to make the changes.

354

Section 354 – 1 .....Second sentence should be eliminated and placed in 350, if it isn't already there.

Section 354-3..... Partial depth repairs are no longer allowed by the Department, (the performance has been horrible even when done right). Need section rewritten accordingly

.....Also in the development of the PCC warranty spec agreement was reached that the defective area (in the wheel path) that can be filled with silicone is when the width is 1" or less (can be left in place). Suggests this spec read the same.

352

Need to address "What" the calibration will consists of and reference that in the specification. Also need to require the calibration to be observed by the Engineer

Section 352-6 .....need to establish the maximum area, or wheel path length, that the longitudinal grooves can be ground out to correct a bump or improve the ride before the area has to be re-grooved.

Section 352-7.....Need the plans prep manual to tell designers to add this pay item to all pcc jobs.....or.....if the grinding is to be included in the cost of the pcc, reword this section accordingly.

353

Not sure why 346 isn't referenced for materials and the concrete called something like "Special Class I" . Since the acceptance and verification samples are referenced in the spec we need a frequency for S&T,...and since this spec doesn't cal the concrete mix a paving class I the how does 346 control??

..... Also is the 750 psi tolerance right for 24 hour breaks ????

Section 353-6 .. Third sentence...why is the phase "unacceptable to the Engineer," here. If the slab cracks replace it.

Will all slab replacement jobs include grinding the finished surface?? If not the spec should address the

straight edging.

Shirley Harvey
01/16/2004 10:38 AM

To: bburleson@ftba.com, acarlisle@ftba.com, Clay McGonagill/CO/FDOT@FDOT, Ananth Prasad/CO/FDOT@FDOT, Charles A Ishee/SM/FDOT@FDOT
cc:
Subject: Approval for D3520000.D02 - Grinding Concrete Pavement

I'm sorry that I forgot to include you in on the attached memo.

shirley harvey
SC 994-4120
(850)414-4120
shirley.harvey@dot.state.fl.us
----- Forwarded by Shirley Harvey/CO/FDOT on 01/16/2004 10:35 AM -----

Shirley Harvey
01/16/2004 10:11 AM

To: donald.davis@fhwa.dot.gov
cc: ann.allshouse@fhwa.dot.gov
Subject: Approval for D3520000.D02 - Grinding Concrete Pavement

D3520000.D02.doc

Please review the attached draft specification and return your approval/comments as soon as possible.

Thanks,
shirley harvey
SC 994-4120
(850)414-4120
shirley.harvey@dot.state.fl.us

Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JOSÉ ABREU
SECRETARY

January 16, 2004

Mr. Donald Davis
Program Operations Engineer
Federal Highway Administration
227 N. Bronough Street, Suite 2015
Tallahassee, Florida 32301

Re: Office of Design, Specifications
Section 352
Proposed Specification: D3520000.D02 – Grinding Concrete Pavement

Dear Mr. Davis:

We are submitting, for your approval, two copies of a proposed Supplemental Specification for Grinding Concrete Pavement.

This change was proposed by Charles Ishee of the State Materials Office to establish minimum size criteria for the equipment.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via Email to SP965DB or duane.brautigam@dot.state.fl.us.

If you have any questions relating to this specification change, please call Duane F. Brautigam, State Specifications Engineer at 414-4110.

Sincerely,

Duane F. Brautigam, P.E.
State Specifications Engineer

DFB/sh
Attachment
cc: General Counsel
Florida Transportation Builders' Assoc.
State Construction Engineer

GRINDING CONCRETE PAVEMENT.
(REV ~~5-13-039-19-0310-29-031-15-04~~)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind ~~existing portland~~ *Portland* cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Identify all equipment for grinding concrete pavement in the Quality Control Plan (QCP) as required in Section 105. Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least ~~three~~3 feet [1 m] wide or as approved ~~in the Quality Control Plan~~by the Engineer.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations. *The equipment will be capable of removing any slurry or residue resulting from the grinding operation.*

352-3 Construction Methods.

Grind the areas of ~~existing~~ pavement surfaces designated on the plans. Do not grind ~~bridge decks and~~ roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. ~~Accomplish g~~Grind~~ing~~ in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. *Take all necessary precautions to minimize the number of minor depressions in the first place and only resolve to grind such areas if necessary.* ~~Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions.~~ Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval ~~of~~ *for* a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. ~~In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil.~~ Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per ~~*linear*~~ foot [200 per ~~*linear*~~ meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for ~~pavement surface~~ smoothness ~~using~~ *with* either a 10 foot [3~~.048~~ m] long straightedge, a 10 foot [3~~.048~~ m] long rolling straightedge, or a California Type Profilograph *while the Engineer observes the operations*. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3~~.048~~ m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3~~.048~~ m] straightedge. When *portland* cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot *[3 m]* length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3~~.048~~ m] rolling straightedge: Use this straightedge for longitudinal profiling of short *pavement* sections ~~of mainline pavement lanes~~ up to 250 feet [75 m] long, ~~pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed~~*including mainline and non-mainline sections on tangent sections and on horizontal curves with a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.*

Furnish and operate the straightedge. Provide and operate a 10 foot [3~~.048~~ m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot *[3 m]* length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device~~:~~

~~Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is~~ in ~~compliance~~*accordance* with ~~Florida Method of Test~~ FM 5-558E ~~for a California Type Profilograph (Electronic Model)~~.

~~The~~ The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface *meeting the requirements of FM 5-558E and* having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3~~.048~~ m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent

sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

~~*Produce, by grinding, a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Ensure that the peaks of ridges are approximately 1/32 inch [0.8 mm] higher than the bottoms of the grooves with approximately 60 evenly spaced grooves per foot [300 mm].*~~

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved. Replace any area of concrete pavement with concrete that meets the requirements of Sections 353 or 354.

~~*Saw the area to be removed to a smooth vertical surface. Clean the face of the adjacent (hardened) concrete, and coat it with an epoxy bonding compound before placing the replacement concrete.*~~

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete.

352-~~5~~*7* Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-~~6~~*8* Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

~~SI Units~~	
~~PI = 80 mm/km~~	~~PI = 110 mm/km~~
~~PI ≤ 30~~	~~PI ≤ 65~~
~~30 < PI ≤ 80~~	~~65 < PI ≤ 110~~
~~PI > 80~~	~~PI > 110~~

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		*Contract Unit Price Adjustments Percent of Pavement Unit Bid Price*
Curvature Radius ≥ 600 m	*300 m ≤ Curvature Radius < 600 m*	
PI ≤ 30	*PI ≤ 65*	*103*
30 < PI ≤ 80	*65 < PI ≤ 110*	*100*
PI > 80	*PI > 110*	*Corrective work required*

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.

Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

GRINDING CONCRETE PAVEMENT.
(REV 1-15-04)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind Portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Identify all equipment for grinding concrete pavement in the Quality Control Plan (QCP) as required in Section 105. Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. The equipment will be of a size that can cut or plane at least 3 feet [1 m] wide or as approved by the Engineer. Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations. The equipment will be capable of removing any slurry or residue resulting from the grinding operation.

352-3 Construction Methods.

Grind the areas of pavement surfaces designated on the plans. Do not grind roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. Grind in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Take all necessary precautions to minimize the number of minor depressions in the first place and only resolve to grind such areas if necessary. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval for a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface

finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for smoothness with either a 10 foot [3 m] long straightedge, a 10 foot [3 m] long rolling straightedge, or a California Type Profilograph while the Engineer observes the operations. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3 m] straightedge. When portland cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot [3 m] length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3 m] rolling straightedge: Use this straightedge for longitudinal profiling of short pavement sections up to 250 feet [75 m] long, including mainline and non-mainline sections on tangent sections and on horizontal curves with a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot [3 m] length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device in accordance with FM 5-558E. The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface meeting the requirements of FM 5-558E and having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved. Replace any area of concrete pavement with concrete that meets the requirements of Sections 353 or 354.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete.

352-7 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-8 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	Percent of Pavement Unit Bid Price
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥ 600 m	300 m ≤ Curvature Radius < 600 m	
PI ≤ 30	PI ≤ 65	103
30 < PI ≤ 80	65 < PI ≤ 110	100
PI > 80	PI > 110	Corrective work required

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.

Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

Florida Department of Transportation

JEB BUSH
GOVERNOR

State Materials Office – Materials Research Park
5007 NE 39th Avenue, Gainesville, FL 32609
Phone (352) 955-6600, Fax (352) 955-6613

JOSÉ ABREU
SECRETARY

MEMORANDUM

DATE: January 12, 2003

TO: Clinton J. Shaw, State Specifications Office

FROM: Charles A. Ishee, Structural Materials Research Engineer

COPIES: Michael J. Bergin, Shirley Harvey

SUBJECT: **Proposed Modifications to Specification: D3520000.D01**

All received comments have been reviewed regarding the subject modification to the Standard Specification and are attached with reply. If you have any questions, please e-mail me at RT822CI or charles.ishee@dot.state.fl.us.

CAI/cai

Attachment

Responses to Comments Received on Draft Specifications

1. **Specification 352-2 (Equipment)**
Submitted by: Brian Price – District 1&7 Materials Office
Comment: Why does it say 'as approved in the Quality Control Plan', this is not an item that is covered in Section 6 Control of Materials, 6-8 quality Control Program.
Response: Agree, changed to read... "Identify all equipment for grinding concrete pavement in the Quality Control Plan (QCP) as required in Section 105. Provide a power driven self-propelled machine that is specifically designed to grind Portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. The equipment will be of a size that can cut or plane at least 3 feet [1 m] wide or as approved by the Engineer. Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations."

2. **Specification 352-3 (Equipment)**
Submitted by: Bouzid Choubane – State Materials Office
Comment: Contractor shall take all necessary precautions to ~~ensure that~~ minimize the number of minor depressions in the first place ~~are not excessive. Grind to avoid having excessive minor depressions.~~ and only resolve to grinding such areas if necessary.
Response: Agree, changed to read... "Take all necessary precautions to minimize the number of minor depressions in the first place and only resolve to grind such areas if necessary."

3. **Specification 352-3 (Construction Methods)**
Submitted by: John Kemp
Comment: Some environmental permitting agencies have voiced concern over concrete residue being disposed of as mentioned in 352-3, fourth paragraph. In particular, the dispersing of the concrete residue (slurry) in rural areas. This may need further investigation to ensure that this proposed means of disposal is acceptable and in adherence with all applicable Laws and permits. A modification to this section of the specification could help avoid claims by the Contractor and avoid potential fines and/or litigation from permitting agencies.
Response: Agree, deleted the second sentence in the fifth paragraph to require all residue to be collected and not allowed to run off and added to 352-2 the following wording... "The equipment will be capable of removing any slurry or residue resulting from the grinding operation."

4. **Specification 352-4 (Final Surface Finish)**
Submitted by: Daniel Haldi – District 5 Materials Office
Comment: 2nd last para, remove and replace procedure is inerror. Should refer contractor to 353 or 350 slab replacement methods. DO NOT WANT epoxy bond between adjecent slabs, would rather like dowels, tie bars and bond breaker.
Response: Agree, deleted sixth paragraph and added the following sentence to fifth paragraph... "Replace any area of concrete pavement with concrete that meets the requirements of Section 353 or 354."

5. **Specification 352-5 (Acceptance Testing for Surface Tolerance)**
Submitted by: Bouzid Choubane – State Materials Office
Comment: (b) Testing with a 10 foot[3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short pavement sections ~~of mainline pavement~~ ~~lanes~~ up to 250 feet [75 m] long, including mainline and non-mainline sections ~~pavements~~ ~~(mainline or non-mainline)~~ , on tangent sections and on horizontal curves ~~having~~ with a centerline radius of curve ....
Response: Agree, changed to read... "(b) Testing with a 10 foot [3 m] rolling straightedge: Use this straightedge for longitudinal profiling of short pavement sections up to 250 feet [75 m] long, including mainline and non-mainline sections on tangent sections and on horizontal curves with a centerline radius

of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed."

6. **Specification 352-5 (Acceptance Testing for Surface Tolerance)**
Submitted by: Bouzid Choubane – State Materials Office
Comment: (c) 2. Equipment: The Contractor shall furnish, calibrate, and operate a California Type Profilograph device in accordance with FM 5-558E.
Response: Agree, changed to read... "(c) 2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device in accordance with FM 5-558E."

7. **Specification 352-5 (Acceptance Testing for Surface Tolerance)**
Submitted by: Bouzid Choubane – State Materials Office
Comment: (c) 3. Surface Test: Produce a riding surface meeting the requirements of FM 5-558E, ~~having~~ and a Profile Index meeting the requirements herein.
Response: Agree, changed to read... "3. Surface Test: Produce a riding surface meeting the requirements of FM 5-558E and having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined."

8. **Specification 352-5 (Acceptance Testing for Surface Tolerance)**
Submitted by: Daniel Haldi – District 5 Materials Office
Comment: (a) paragraph 2, what kind of cement concrete pavement IE portland or asphaltic?
Response: Agree, changed to read... "When Portland cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot [3 m] length."

9. **Specification 352-5 (Acceptance Testing for Surface Tolerance)**
Submitted by: Daniel Haldi – District 5 Materials Office
Comment: (b) last para, what is writer saying?
Response: "The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed." This allows for the contractor to use straightedge in tight locations which happens on some projects and is needed. No change needed.

10. **Specification 352-5 (Acceptance Testing for Surface Tolerance)**
Submitted by: Daniel Haldi – District 5 Materials Office
Comment: (c) [2] operate in prescence or Engineer ... shouldn't straightedge and rolling straightedge be observed by engineer too?
Response: Agree, 352- 5 (c) [2] deleted the sentence and added to 352-5 (general) as follows... "Test the pavement surface for smoothness with either a 10 foot [3 m] long straightedge, a 10 foot [3 m] long rolling straightedge, or a California Type Profilograph while the Engineer observes the operations."

11. **Specification 352-6 (Surface Corrections)**
Submitted by: Daniel Haldi – District 5 Materials Office
Comment: is mostly repeat of 352-4.
Response: Agree, deleted third paragraph to reduce any redundancy.

12. **Specification 352 (General)**
Submitted by: Jim Martin – District II Specification Office
Comment: In 352, they are not following the same protocol as they did in 350. In 350, they cross off the ".048" when going metric for 10 feet. However, in 352, they describe 10 feet as being 3.048 meters, The specs should agree in the interpretation of what 10 feet is.
Response: Agree, both specifications will be changed to describe 10 feet as being 3 meters.

GRINDING CONCRETE PAVEMENT.
(REV 10-29-03)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind Portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Identify all equipment for grinding concrete pavement in the Quality Control Plan (QCP) as required in Section 105. Provide a power driven self-propelled machine that is specifically designed to grind Portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. The equipment will be of a size that can cut or plane at least 3 feet [1 m] wide or as approved by the Engineer. Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations. The equipment will be capable of removing any slurry or residue resulting from the grinding operation.

352-3 Construction Methods.

Grind the areas of pavement surfaces designated on the plans. Do not grind roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. Grind in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Take all necessary precautions to minimize the number of minor depressions in the first place and only resolve to grind such areas if necessary. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval for a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface finish with the peaks of the ridges

approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for smoothness with either a 10 foot [3 m] long straightedge, a 10 foot [3 m] long rolling straightedge, or a California Type Profilograph while the Engineer observes the operations. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3 m] straightedge. When Portland cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot [3 m] length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3 m] rolling straightedge: Use this straightedge for longitudinal profiling of short pavement sections up to 250 feet [75 m] long, including mainline and non-mainline sections on tangent sections and on horizontal curves with a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot [3 m] length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device in accordance with FM 5-558E. The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface meeting the requirements of FM 5-558E and having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved. Replace any area of concrete pavement with concrete that meets the requirements of Section 353 or 354.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete.

352-7 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-8 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥ 600 m	300 m ≤ Curvature Radius < 600 m	
PI ≤ 30	PI ≤ 65	103
30 < PI ≤ 80	65 < PI ≤ 110	100
PI > 80	PI > 110	Corrective work required

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70-	Grinding Concrete Pavement - per square yard.
Item No. 2352- 70-	Grinding Concrete Pavement - per square meter.

Shirley Harvey
01/08/2004 10:21 AM

To: Charles A Ishee/SM/FDOT@FDOT, Michael Bergin/SM/FDOT@FDOT
cc:
Subject: Comments on Proposed Spec D3520000.D01 - Grinding Concrete Pavement

D3520000.D01.doc

Please review the attached draft specification and return your comments as soon as possible so that we can get send it over to FHWA for approval.

These comments are from Industry Review memo dated November 3, 2003.

Thanks for your help in this matter,
shirley harvey
SC 994-4120
(850)414-4120
shirley.harvey@dot.state.fl.us

Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JOSÉ ABREU
SECRETARY

MEMORANDUM

DATE: January 8, 2004

TO: Charles Ishee, State Materials Office

COPY: Mike Bergin, State Materials Office

FROM: Clinton J. Shaw, State Specifications Office

SUBJECT: **Proposed Modifications To Specification: D3520000.D01 – Grinding Concrete Pavement**

Comments received, regarding the subject modification to the Standard Specifications, are attached. Please review these comments and advise of any further modifications as soon as possible. Also, please submit an electronic summary, of your decisions concerning these comment(s) in memorandum format. This summary will be posted on the State Specifications Office Web Page and included in the Specifications folder for future reference, should someone question your response. Your assistance will be appreciated.

Please Email submittals to SP965CS or clinton.shaw@dot.state.fl.us.

CS/sh

Attachment

GRINDING CONCRETE PAVEMENT.
(REV ~~5-13-03~~*9-19-03*10-29-03)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind ~~existing portland~~ *Portland* cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least ~~three~~3 feet [1 m] wide or as approved in the Quality Control Plan.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of ~~existing~~ pavement surfaces designated on the plans. Do not grind ~~bridge decks and~~ roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. ~~Accomplish g~~Grind~~ing~~ in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval ~~of~~ *for* a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface

finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per ~~*linear*~~ foot [200 per ~~*linear*~~ meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for ~~pavement surface~~ smoothness ~~using~~ *with* either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short sections of mainline pavement lanes up to 250 feet [75 m] long, pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test FM 5-558E for a California Type Profilograph (Electronic Model).

The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Produce, by grinding, a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Ensure that the peaks of ridges are approximately 1/32 inch [0.8 mm] higher than the bottoms of the grooves with approximately 60 evenly spaced grooves per foot [300 mm].

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved.

Saw the area to be removed to a smooth vertical surface. Clean the face of the adjacent (hardened) concrete, and coat it with an epoxy bonding compound before placing the replacement concrete.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete.

352-~~5~~-*7* Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-~~6~~-*8* Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	Percent of Pavement Unit Bid Price
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

~~SI Units~~	
~~PI = 80 mm/km~~	~~PI = 110 mm/km~~
~~PI ≤ 30~~	~~PI ≤ 65~~
~~30 < PI ≤ 80~~	~~65 < PI ≤ 110~~
~~PI > 80~~	~~PI > 110~~

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		*Contract Unit Price Adjustments Percent of Pavement Unit Bid Price*
Curvature Radius ≥ 600 m	*300 m ≤ Curvature Radius < 600 m*	
PI ≤ 30	*PI ≤ 65*	*103*
30 < PI ≤ 80	*65 < PI ≤ 110*	*100*
PI > 80	*PI > 110*	*Corrective work required*

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.
Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

Bouzid Choubane
12/02/2003 03:47
Please find below our suggested changes:

D3520000_ Grinding Concrete Pavement (add page numbers)

SECTION 352

Page 1

352-3 Contractor shall take all necessary precautions to ~~ensure that~~ minimize the number of minor depressions in the first place ~~are not excessive. Grind to avoid having excessive minor depressions.~~ and only resolve to grinding such areas if necessary.

352-4 (b) Testing with a 10 foot[3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short pavement sections ~~of mainline pavement~~ ~~lanes~~ up to 250 feet [75 m] long, including mainline and non-mainline sections ~~pavements~~ ~~(mainline or non-mainline)~~ , on tangent sections and on horizontal curves ~~having~~ with a centerline radius of curve ....

352-5 (c) 2. Equipment: The Contractor shall furnish, calibrate, and operate a California Type Profilograph device in accordance with FM 5-558E.

352-5 (c) 3. Surface Test: Produce a riding surface meeting the requirements of FM 5-558E, ~~having~~ and a Profile Index meeting the requirements herein.

Duane F Brautigam

12/01/2003 07:54 AM

To: Clinton Shaw/CO/FDOT@FDOT
cc:
Subject: Data posted to form 1 of http: //www11.myflorida.com/specificationsoffice/IndustryReview.htm

Duane F. Brautigam, P.E.
State Specifications Engineer
Florida Department of Transportation
(850) 414-4130; SC 994-4130
duane.brautigam@dot.state.fl.us
----- Forwarded by Duane F Brautigam/CO/FDOT on 12/01/2003 07:54 AM -----

<webmaster@dot.state.fl.us>

11/26/2003 09:28 AM

To: <duane.brautigam@dot.state.fl.us>
cc:
Subject: Data posted to form 1 of http: //www11.myflorida.com/specificationsoffice/IndustryReview.htm

```
**************************************************************
**************
File:              D3520000.D01 - Grinding Concrete Pavement
Username:          Brian Price
UserEmail:         brian.price@dot.state.fl.us.
UserTel:           SC 557-4245
UserFAX:           SC 515-0569
ContactRequested:
Remote Name:       156.75.10.115
Remote User:

Comments:

352-2 Equipment
Why does it say 'as approved in the Quality Control Plan', this
is not an
item that is covered in Section 6 Control of Materials, 6-8
quality
Control Program.
```

Duane F Brautigam

12/01/2003 12:46 PM

To: Clinton Shaw/CO/FDOT@FDOT
cc:
Subject: Data posted to form 1 of http://www11.myflorida.com/specificationsoffice/IndustryReview.htm

Duane F. Brautigam, P.E.
State Specifications Engineer
Florida Department of Transportation
(850) 414-4130; SC 994-4130
duane.brautigam@dot.state.fl.us
----- Forwarded by Duane F Brautigam/CO/FDOT on 12/01/2003 12:46 PM -----

<webmaster@dot.state.fl.us>

12/01/2003 12:41 PM

To: <duane.brautigam@dot.state.fl.us>
cc:
Subject: Data posted to form 1 of http://www11.myflorida.com/specificationsoffice/IndustryReview.htm

```
**********************************************************************
**************
File:              D3520000.D01 - Grinding Concrete Pavement
Username:          Daniel F. Haldi
UserEmail:         daniel.haldi@dot.state.fl.us
UserTel:           386-740-3516
UserFAX:           386-736-5178
ContactRequested:
Remote Name:       156.75.75.113
Remote User:

Comments:

352-5(a) para 2, what kind of cement concrete pavement IE
portland or
asphaltic?

352-5(b) last para, what is writer saying?

352-5 (c) [2] operate in prescence or Engineer ... shouldn't
straightedge
and rolling straightedge be observed by engineer too?

352-6 is mostly repeat of 352-4.

352-4, 2nd last para, remove and replace procedure is inerror.
Should refer
```

contractor to 353 or 350 slab replacement methods. DO NOT WANT epoxy bond
between adjecent slabs, would rather like dowels, tie bars and bond breaker.

END

John,

These are the comments from D2 personnel. If I am not following protocol please let me know.

1. These specs are going into CQC, so whenever there is concrete pavement to be done, it will also have to be listed in the CQC plan.
However, I do not see where spec 6-8 is being changed to accommodate this additional set of specifications. Is 6-8 going to be changed?
2. In 352, they are not following the same protocol as they did in 350. In 350, they cross off the ".048" when going metric for 10 feet. However, in 352, they describe 10 feet as being 3.048 meters, The specs should agree in the interpretation of what 10 feet is.
3. In 353, they have some grammar problems. See the fourth paragraph of 353-4. Delete the word "is".

Best Regards, Jim

Jim Martin, P.E.
District II Specifications Engineer
386.961.7577, SC 8

Duane F Brautigam

11/05/2003 01:24 PM

To: Clinton Shaw/CO/FDOT@FDOT
cc:
Subject: Data posted to form 1 of http: //www.dot.state.fl.us/specificationsoffice/IndustryReview.htm

Duane F. Brautigam, P.E.
State Specifications Engineer
Florida Department of Transportation
(850) 414-4130; SC 994-4130
duane.brautigam@dot.state.fl.us
----- Forwarded by Duane F Brautigam/CO/FDOT on 11/05/2003 01:24 PM -----

<webmaster@dot.state.fl.us>

11/05/2003 10:06 AM

To: <duane.brautigam@dot.state.fl.us>
cc:
Subject: Data posted to form 1 of http: //www.dot.state.fl.us/specificationsoffice/IndustryReview.htm

****
****
File: D3520000.D01 - Grinding Concrete Pavement
Username: John Kemp
UserEmail: pbcssgi@gtcom.net
UserTel: 850-670-5512
UserFAX: 850-670-5514
ContactRequested: ContactRequested
Remote Name: 12.173.139.165
Remote User:

Comments:

Some environmental permitting agencies have voiced concern over concrete
residue being disposed of as mentioned in 352-3, fourth paragraph. In
particular, the dispersing of the concrete residue (slurry) in rural areas.
This may need further investigation to ensure that this proposed means of
disposal is acceptable and in adherence with all applicable Laws and
permits.
A modification to this section of the specification could help avoid claims

by the Contractor and avoid potential fines and/or litigation from
permitting agencies.

Shirley Harvey
12/03/2003 03:34 PM

To: Bouzid Choubane/SM/FDOT@FDOT
cc: Clinton Shaw/CO/FDOT@FDOT
Subject: Proposed Spec D3520000.D02 - Grinding Concrete Pavement

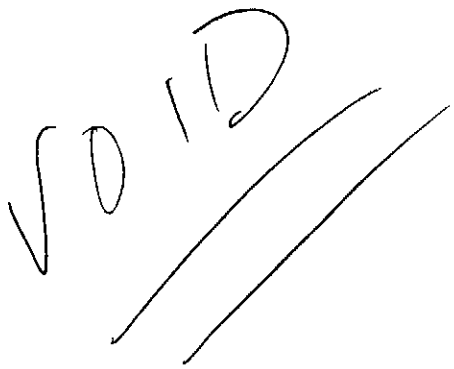
D3520000.d02.doc

Please review the attached document to make sure that all the changes are made that you requested.

I need a response from you by Friday (December 5, 2003), if I don't hear from you I will assume that everything is ok and will forward the spec over to FHWA for their review/approval.

If you have any questions please call.

Thanks,
shirley harvey
SC 994-4120
(850)414-4120
shirley.harvey@dot.state.fl.us



GRINDING CONCRETE PAVEMENT.
(REV ~~5-13-03~~ *39-19-03* ~~10-29-03~~ *12-3-03*)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind ~~existing portland~~ *Portland* cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least ~~three~~3 feet [1 m] wide or as approved in the Quality Control Plan.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of ~~existing~~ pavement surfaces designated on the plans. Do not grind ~~bridge decks and~~ roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. ~~Accomplish g~~Grind~~ing~~ in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Contractor shall ~~ensure that~~*take all necessary precautions to minimize the number of* minor depressions *in the first place* ~~are not excessive. Grind to avoid having excessive minor depressions.~~ *and only resolve to grinding such areas if necessary.* Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval ~~of~~ *for* a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. In rural construction, the Contractor may disperse residue

onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per ~~*linear*~~ foot [200 per ~~*linear*~~ meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for ~~pavement surface~~ smoothness ~~using~~ *with* either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short *pavement* sections ~~of mainline pavement~~ ~~lanes~~ up to 250 feet [75 m] long, *including mainline and non-mainline sections* ~~pavements~~ ~~(mainline or non-mainline)~~, *on tangent sections and* on horizontal curves ~~having~~*with* a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: *The Contractor* shall ~~F~~*f*urnish, calibrate, and operate a California Type Profilograph device *in accordance with FM 5-558E.*

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test FM 5-558E for a California Type Profilograph (Electronic Model).

The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface *meeting the requirements of FM 5-558E,* ~~having~~*and* a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Produce, by grinding, a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Ensure that the peaks of ridges are approximately 1/32 inch [0.8 mm] higher than the bottoms of the grooves with approximately 60 evenly spaced grooves per foot [300 mm].

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved.

Saw the area to be removed to a smooth vertical surface. Clean the face of the adjacent (hardened) concrete, and coat it with an epoxy bonding compound before placing the replacement concrete.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete.

352-~~5~~-*7* Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-~~6~~-*8* Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

~~SI Units~~	
~~PI = 80 mm/km~~	~~PI = 110 mm/km~~
~~PI ≤ 30~~	~~PI ≤ 65~~
~~30 < PI ≤ 80~~	~~65 < PI ≤ 110~~
~~PI > 80~~	~~PI > 110~~

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		*Contract Unit Price Adjustments Percent of Pavement Unit Bid Price*
Curvature Radius ≥ 600 m	*300 m ≤ Curvature Radius < 600 m*	
PI ≤ 30	*PI ≤ 65*	*103*
30 < PI ≤ 80	*65 < PI ≤ 110*	*100*
PI > 80	*PI > 110*	*Corrective work required*

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.
Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

D3520000_ Grinding Concrete Pavement (add page numbers)

SECTION 352

Page 1

352-3 Contractor shall take all necessary precautions to ~~ensure that~~ minimize the number of minor depressions in the first place ~~are not excessive. Grind to avoid having excessive minor depressions.~~ and only resolve to grinding such areas if necessary.

352-4 (b) Testing with a 10 foot[3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short pavement sections ~~of mainline pavement~~ ~~lanes~~ up to 250 feet [75 m] long, including mainline and non-mainline sections ~~pavements (mainline or non-mainline)~~ , on tangent sections and on horizontal curves ~~having~~ with a centerline radius of curve ....

352-5 (c) 2. Equipment: The Contractor shall furnish, calibrate, and operate a California Type Profilograph device in accordance with FM 5-558E.

352-5 (c) 3. Surface Test: Produce a riding surface meeting the requirements of FM 5-558E, ~~having~~ and a Profile Index meeting the requirements herein.

GRINDING CONCRETE PAVEMENT.

(REV ~~5-13-039-19-0310-29-0312-3-03~~)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind ~~existing portland~~ *Portland* cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least ~~three~~3 feet [1 m] wide or as approved in the Quality Control Plan.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of ~~existing~~ pavement surfaces designated on the plans. Do not grind ~~bridge decks and~~ roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. ~~Accomplish g~~Grind~~ing~~ in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Contractor shall ~~ensure that~~take all necessary precautions to minimize the number of minor depressions in the first place ~~are not excessive. Grind to avoid having excessive minor depressions.~~ and only resolve to grinding such areas if necessary. Continue grinding if accumulated total areas of minor

depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval ~~of~~ *for* a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per ~~linear~~ foot [200 per ~~linear~~ meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for ~~pavement surface~~ smoothness ~~using~~ *with* either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short pavement sections ~~of mainline pavement~~ ~~lanes~~ up to 250 feet [75 m] long, including mainline and non-mainline sections ~~pavements~~ ~~(mainline or non-mainline)~~, on tangent sections and on horizontal curves ~~having~~with a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: The Contractor shall ~~F~~furnish, calibrate, and operate a California Type Profilograph device in accordance with FM 5-558E.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test FM 5-558E for a California Type Profilograph (Electronic Model).

The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface meeting the requirements of FM 5-558E, ~~having~~and a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these

requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Produce, by grinding, a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance.

Ensure that the peaks of ridges are approximately 1/32 inch [0.8 mm] higher than the bottoms of the grooves with approximately 60 evenly spaced grooves per foot [300 mm].

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved.

Saw the area to be removed to a smooth vertical surface. Clean the face of the adjacent (hardened) concrete, and coat it with an epoxy bonding compound before placing the replacement concrete.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete.

352-~~5~~-*7* Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-~~6~~-*8* Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

~~SI Units~~	
~~PI = 80 mm/km~~	~~PI = 110 mm/km~~
~~PI ≤ 30~~	~~PI ≤ 65~~
~~30 < PI ≤ 80~~	~~65 < PI ≤ 110~~
~~PI > 80~~	~~PI > 110~~

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		*Contract Unit Price Adjustments Percent of Pavement Unit Bid Price*
Curvature Radius ≥ 600 m	*300 m ≤ Curvature Radius < 600 m*	
PI ≤ 30	*PI ≤ 65*	*103*
30 < PI ≤ 80	*65 < PI ≤ 110*	*100*
PI > 80	*PI > 110*	*Corrective work required*

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.

Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

POSTED 11/3/03

Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JOSÉ ABREU
SECRETARY

MEMORANDUM

DATE: November 3, 2003

TO: Specification Review Distribution List

FROM: Duane F. Brautigam, P.E., State Specifications Engineer

SUBJECT: **Proposed Specifications Change: D3520000.D01 – Grinding Concrete Pavement**

In accordance with Specification Development Procedures, we are sending you a copy of a proposed specification change to Grinding Concrete Pavement.

This change was proposed by Charles Ishee of the State Materials Office to establish minimum size criteria for the equipment.

Please share this proposal with others within your responsibility. Review comments are due within four weeks and should be sent to Mail Station 75 or to my attention via e-mail at SP965DB or duane.brautigam@dot.state.fl.us. Comments received after December 1, 2003 may not be considered. Your input is encouraged.

DFB/sh

Attachment

COMMENTS: _____

_____

_____

_____

_____

_____

Submitted by: _____ Phone #: _____

GRINDING CONCRETE PAVEMENT.
(REV ~~5-13-03~~*39-19-03*10-29-03)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind ~~existing portland~~ *Portland* cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least ~~three~~3 feet [1 m] wide or as approved in the Quality Control Plan.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of ~~existing~~ pavement surfaces designated on the plans. Do not grind ~~bridge decks and~~ roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. ~~Accomplish g~~Grind~~ing~~ in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval ~~of~~*for* a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface

finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per ~~*linear*~~ foot [200 per ~~*linear*~~ meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for ~~pavement surface~~ smoothness ~~using~~ *with* either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short sections of mainline pavement lanes up to 250 feet [75 m] long, pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test FM 5-558E for a California Type Profilograph (Electronic Model).

The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Produce, by grinding, a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Ensure that the peaks of ridges are approximately 1/32 inch [0.8 mm] higher than the bottoms of the grooves with approximately 60 evenly spaced grooves per foot [300 mm].

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved.

Saw the area to be removed to a smooth vertical surface. Clean the face of the adjacent (hardened) concrete, and coat it with an epoxy bonding compound before placing the replacement concrete.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete.

352-~~5~~-*7* Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-~~6~~-*8* Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	Percent of Pavement Unit Bid Price
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

~~SI Units~~	
~~PI = 80 mm/km~~	~~PI = 110 mm/km~~
~~PI ≤ 30~~	~~PI ≤ 65~~
~~30 < PI ≤ 80~~	~~65 < PI ≤ 110~~
~~PI > 80~~	~~PI > 110~~

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		*Contract Unit Price Adjustments Percent of Pavement Unit Bid Price*
Curvature Radius ≥ 600 m	*300 m ≤ Curvature Radius < 600 m*	
PI ≤ 30	*PI ≤ 65*	*103*
30 < PI ≤ 80	*65 < PI ≤ 110*	*100*
PI > 80	*PI > 110*	*Corrective work required*

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.
Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

Shirley Harvey

10/29/2003 09:36 AM

To: Charles A Ishee/SM/FDOT@FDOT
cc: Michael Bergin/SM/FDOT@FDOT
Subject: Proposed Spec D3520000.D01 - Grinding Concrete Pavement

D3520000.d01.doc

Please review the attached document and let me know if there are any changes that need to be made.

I talked with John Owens this morning and he said that you were waiting on me to review and approve it so that we can get it out for Industry Review along with the others.

If you have any questions please let me know.

Thanks,
shirley harvey
SC 994-4120
(850)414-4120
shirley.harvey@dot.state.fl.us

GRINDING CONCRETE PAVEMENT.
(REV ~~5-13-03~~*9-19-03*~~*10*~~*-29-03*)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind ~~existing portland~~ *Portland* cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least* ~~*three*~~*3 feet [1 m] wide or as approved in the Quality Control Plan.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of ~~existing~~ pavement surfaces designated on the plans. Do not grind ~~bridge decks and~~ roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. ~~Accomplish g~~Grind~~ing~~ in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval ~~of~~ *for* a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. In rural construction, the Contractor may disperse residue

onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per ~~*linear*~~ foot [200 per ~~*linear*~~ meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for ~~pavement surface~~ smoothness ~~using~~ *with* either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short sections of mainline pavement lanes up to 250 feet [75 m] long, pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test FM 5-558E for a California Type Profilograph (Electronic Model).

The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and

pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Produce, by grinding, a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Ensure that the peaks of ridges are approximately 1/32 inch [0.8 mm] higher than the bottoms of the grooves with approximately 60 evenly spaced grooves per foot [300 mm].

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved.

Saw the area to be removed to a smooth vertical surface. Clean the face of the adjacent (hardened) concrete, and coat it with an epoxy bonding compound before placing the replacement concrete.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete.

352-~~5~~-7 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-~~6~~-8 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

~~SI Units~~	
~~PI = 80 mm/km~~	~~PI = 110 mm/km~~
~~PI ≤ 30~~	~~PI ≤ 65~~
~~30 < PI ≤ 80~~	~~65 < PI ≤ 110~~
~~PI > 80~~	~~PI > 110~~

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		*Contract Unit Price Adjustments Percent of Pavement Unit Bid Price*
Curvature Radius ≥ 600 m	*300 m ≤ Curvature Radius < 600 m*	
PI ≤ 30	*PI ≤ 65*	*103*
30 < PI ≤ 80	*65 < PI ≤ 110*	*100*
PI > 80	*PI > 110*	*Corrective work required*

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No.	352- 70-	Grinding Concrete Pavement - per square yard.
Item No.	2352- 70-	Grinding Concrete Pavement - per square meter.

Clinton Shaw
10/23/2003 09:42 AM

To: Judy F Frazier/CO/FDOT@FDOT, Shirley Harvey/CO/FDOT@FDOT
cc:
Subject: Specifications 350, 352, 353, 354 & 355

Hello,

D3500000.D02 is now in the Develop folder. This proposed change is to be resubmitted to Industry for another review.

Thanks

Clinton J. Shaw
(850) 414-4129 SC 994-4129
Clinton.Shaw@dot.state.fl.us
----- Forwarded by Clinton Shaw/CO/FDOT on 10/23/2003 09:38 AM -----

John H Owens
10/14/2003 07:41 AM

To: Clinton Shaw/CO/FDOT@FDOT
cc:
Subject: Specifications 350, 352, 353, 354 & 355

Good morning, well here they are.

Thank You, Have A Great Day,

John H. Owens
F.D.O.T. Specifications Office
(850) 414-4113 Fax (850) 413-7385
E-Mail: john.owens@dot.state.fl.us

----- Forwarded by John H Owens/CO/FDOT on 10/14/2003 07:40 AM -----

Charles A Ishee
10/13/2003 08:37 PM

To: Duane F Brautigam/CO/FDOT@FDOT
cc: John H Owens/CO/FDOT@FDOT, Michael Bergin/SM/FDOT@FDOT, David Sadler/CO/FDOT@FDOT
Subject: Specifications 350, 352, 353, 354 & 355

Duane:

After receiving multiple comments from industry and FHWA, the following specifications has been modified to address all parties concerns. Please prepare these documents and send them back out for industry review to become part of the Standard Specifications. The one specification that may not need to be sent out is 355, because just one sentence was added to allow for materials meeting the requirements of 354. So, please send out the following specifications for industry review. If you have any comments or questions, please feel free to give me a call. Thanks =)

D3500000.doc 3520000.doc D3530000.doc D3540001.doc D3550000.doc

---

Charles A. Ishee, P.E.
Structural Materials Research Engineer

T: 352-955-6668 (SC 625-6668)
F: 352-955-6680 (SC 625-6680)
E: charles.ishee@dot.state.fl.us

GRINDING CONCRETE PAVEMENT.
(REV ~~5-13-03~~*9-19-03*)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind ~~existing portland~~ *Portland* cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least ~~three~~3 feet [1 m] wide or as approved in the Quality Control Plan.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of ~~existing~~ pavement surfaces designated on the plans. Do not grind ~~bridge decks and~~ roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. ~~Accomplish g~~Grind~~ing~~ in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval ~~of~~ *for* a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface

finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per *linear* foot [200 per *linear* meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

352-5 Acceptance Testing for Surface Tolerance.

Test the pavement surface for ~~pavement surface~~ smoothness ~~using~~ *with* either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short sections of mainline pavement lanes up to 250 feet [75 m] long, pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test FM 5-558E for a California Type Profilograph (Electronic Model).

The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-6 Surface Corrections.

After the curing period, test the surface for pavement surface smoothness in accordance with 352-5. Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Produce, by grinding, a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Ensure that the peaks of ridges are approximately 1/32 inch [0.8 mm] higher than the bottoms of the grooves with approximately 60 evenly spaced grooves per foot [300 mm].

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved.

Saw the area to be removed to a smooth vertical surface. Clean the face of the adjacent (hardened) concrete, and coat it with an epoxy bonding compound before placing the replacement concrete.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete.

352-5-7 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-6-8 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	Percent of Pavement Unit Bid Price
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

~~SI Units~~	
~~PI = 80 mm/km~~	~~PI = 110 mm/km~~
~~PI ≤ 30~~	~~PI ≤ 65~~
~~30 < PI ≤ 80~~	~~65 < PI ≤ 110~~
~~PI > 80~~	~~PI > 110~~

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		*Contract Unit Price Adjustments Percent of Pavement Unit Bid Price*
Curvature Radius ≥ 600 m	*300 m ≤ Curvature Radius < 600 m*	
PI ≤ 30	*PI ≤ 65*	*103*
30 < PI ≤ 80	*65 < PI ≤ 110*	*100*
PI > 80	*PI > 110*	*Corrective work required*

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.
Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

Shirley Harvey
07/14/2003 11:55 AM

To: Charles A Ishee/SM/FDOT, Michael Bergin/SM/FDOT
cc:
Subject: Proposed Spec D3520000.D01 - Grinding Concrete Pavement

D3520000.d01.doc

Please review the above referenced spec, as requested by Mike and submit any additional changes or approval.

If you have any questions please call.

Thanks,
shirley harvey
SC 994-4120
(850)414-4120
shirley.harvey@dot.state.fl.us

Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JOSÉ ABREU
SECRETARY

MEMORANDUM

DATE: July 14, 2003

TO: Charles Ishee and Mike Bergin

FROM: Clinton J. Shaw, State Specifications Office

SUBJECT: **Proposed Specification: D3520000.D01 – Grinding Concrete Pavement**

This is a draft version that incorporates the latest revision that was submitted to us after your meeting with Greg Schiess of FHWA and the Construction Office. Please verify that all changes are incorporated and any cross referencing is correct.

If you have any questions, please contact Clinton Shaw at (850) 414-4129 or Suncom 994-4129. Your immediate response will be appreciated.

CS/sh
Attachment

GRINDING CONCRETE PAVEMENT.
(REV ~~5-13-03~~*7-10-03*)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind existing portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least ~~three~~3 feet [1 m] wide.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of existing pavement surfaces designated on the plans. Do not grind bridge decks and roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. ~~Accomplish g~~Grind~~ing~~ in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval ~~of~~*for* a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface

finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

Test the pavement surface for ~~pavement surface~~ smoothness ~~using~~ *with* either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short sections of mainline pavement lanes up to 250 feet [75 m] long, pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test FM 5-558E for a California Type Profilograph (Electronic Model).

The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-5 Surface Corrections

After the curing period, test the surface for pavement surface smoothness in accordance with 352-4(c). Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Produce, by grinding, a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Ensure that the peaks of ridges are approximately 1/32 inch [0.8 mm] higher than the bottoms of the grooves with approximately 60 evenly spaced grooves per foot [300 mm].

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved.

Saw the area to be removed to a smooth vertical surface. Clean the face of the adjacent (hardened) concrete, and coat it with an epoxy bonding compound before placing the replacement concrete.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete.

352-56 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-67 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

~~SI Units~~	
~~PI = 80 mm/km~~	~~PI = 110 mm/km~~
~~PI ≤ 30~~	~~PI ≤ 65~~
~~30 < PI ≤ 80~~	~~65 < PI ≤ 110~~
~~PI > 80~~	~~PI > 110~~

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		*Contract Unit Price Adjustments Percent of Pavement Unit Bid Price*
Curvature Radius ≥ 600 m	*300 m ≤ Curvature Radius < 600 m*	
PI ≤ 30	*PI ≤ 65*	*103*
30 < PI ≤ 80	*65 < PI ≤ 110*	*100*
PI > 80	*PI > 110*	*Corrective work required*

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.
Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

Charles A Ishee

07/09/2003 12:55 AM

To: Greg.Schiess@fhwa.dot.gov
cc: Clinton Shaw/CO/FDOT@FDOT, John H Owens/CO/FDOT@FDOT, Shirley Harvey/CO/FDOT@FDOT, Michael Bergin/SM/FDOT@FDOT, David Sadler/CO/FDOT@FDOT, David Y Wang/CO/FDOT@FDOT
Subject: Comments from industry review of 350, 352, and 353

Mr. Scheiss:

Here are the changes that we talked about the other day. I have included five different files and hopefully copied everyone in to help expedite the process to follow. The first three files are the reply to only the comments that I received from the specifications office. The last two files are with the modifications we discussed. What I am sending you is just for informational purposes. If there is going to be a final version, then that must come from the specifications office. Hopefully, this will get everyone on the same page. I have also looked through the rest of the specification book and the other specifications that would have to be reviewed with the changes we discussed are: 180-6.2 and 400-20. If anyone has any questions, please feel free to give me a call at the number below. Thanks....

Reply to Spec 350 Comments.d Reply to Spec 352 Comments.d D3530000.doc

Reply to Spec 350 with FHWA Comments. Reply to Spec 352 with FHWA Comments.

Charles A. Ishee, P.E.
Structural Materials Research Engineer
T: 352-955-6668 (SC 625-6668)
C: 352-339-2376
E: charles.ishee@dot.state.fl.us

Florida Department of Transportation

JEB BUSH
GOVERNOR

State Materials Office
5007 Northeast 39th Avenue
Gainesville, FL 32609

JOSÉ ABREU
SECRETARY

MEMORANDUM

DATE: July 8, 2003

TO: Clinton J. Shaw, State Specifications Office

FROM: Charles A. Ishee, P.E., Structural Materials Research Engineer

COPIES: John Owens, Shirley Harvey, Michael Bergin

SUBJECT: **Proposed Modifications To Specification: D3520000 – Grinding Concrete Pavement**

Comments reviewed, regarding the subject modification to the Standard Specifications, are attached. If you have any questions, please Email me at RT822CI or charles.ishee@dot.state.fl.us.

Attachment

Responses to Comments Received on Draft Specifications

1. **Specification 352-2**
Submitted by: Wayne Bloodworth – Eagle
Comment: I would suggest under section 352-2 EQUIPMENT (replace next to last sentence with the following) "The equipment shall have at least 250 horsepower, a minimum gross weight of 25,000 pounds and be capable of grinding at least 36 inches wide in one pass without causing spalls at cracks, joints or other locations" (or similar wording).
Response: Since this concrete is going to be placed with the 355 specification, the important aspect to the pavement is the ride characteristic that is covered in that specification. This information should be in the Quality Control Plan and not in the specification – No changes needed

2. **Specification 352-2**
Submitted by: Al Weeks – tbegroup
Comment: On an urban curb and gutter concrete pavement replacement and grind project the Contractor utilized this size machines. They could not grind within 6" of the curb and pavement joint even with the machine track running on the gutter concrete. This left the existing pavement marking edge line remain instead of being removed as the E.O.R intended. A smaller machine might be able to get this area.
Response: Agree to an extent - Replace sentence with "The equipment will be of a size that can cut or plane at least 3 feet [1 m] wide or as approved in the Quality Control Plan."

3. **Specification 352-2**
Submitted by: Gerald Cavallaro & Tony Harvey
Comment: IF ONLY ONE SENTENCE IS BEING ADDED TO ONE SUBARTICLE, WHY DELETE AND REPLACE THE WHOLE SECTION? THIS ADDS UNNECESSARY PAPER TO SPEC. PACKAGES.
Response: This is the procedure as defined by the Specification's Office – No changes needed

4. **Specification 353-1**
Submitted by: Nour Nazef
Comment: Capitalize ~~p~~Portland cement because it is a Sir name.
Response: Agree

5. **Specification 352-3**
Submitted by: Nour Nazef
Comment: Change sentence to make it more active voice to "~~Accomplish grinding~~ Grind in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane." Replace "of" in first sentence of fourth paragraph with "for".
Response: Agree

6. **Specification 352-4**
Submitted by: Nour Nazef
Comment: Delete second usage of "pavement surface" in first sentence of third paragraph. Change the word "using" into "with" in the same sentence.
Response: Agree

7. **Specification 352-6**
Submitted by: Greg Schiess – Federal Highway Administration
Comment: Correct table for SI Units to be similar to Non-SI Units table.
Response: Agree

GRINDING CONCRETE PAVEMENT.
(REV 5-13-03)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind existing ~~portland~~ *Portland* cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least* ~~*three*~~*3 feet [1 m] wide or as approved in the Quality Control Plan.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of existing pavement surfaces designated on the plans. Do not grind bridge decks and roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. ~~Accomplish g~~*G*rind~~ing~~ in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval ~~of~~ *for* a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface

finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

Test the pavement surface for ~~pavement surface~~ smoothness ~~using~~ *with* either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short sections of mainline pavement lanes up to 250 feet [75 m] long, pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test FM 5-558E for a California Type Profilograph (Electronic Model).

The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-5 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-6 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

~~SI Units~~	
~~PI = 80 mm/km~~	~~PI = 110 mm/km~~
~~PI ≤ 30~~	~~PI ≤ 65~~
~~30 < PI ≤ 80~~	~~65 < PI ≤ 110~~
~~PI > 80~~	~~PI > 110~~

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		*Contract Unit Price Adjustments Percent of Pavement Unit Bid Price*
Curvature Radius ≥ 600 m	*300 m ≤ Curvature Radius < 600 m*	
PI ≤ 30	*PI ≤ 65*	*103*
30 < PI ≤ 80	*65 < PI ≤ 110*	*100*
PI > 80	*PI > 110*	*Corrective work required*

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.

Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

Michael Bergin
07/14/2003 10:48 AM

To: John H Owens/CO/FDOT@FDOT
cc: Charles A Ishee/SM/FDOT@FDOT, Clinton Shaw/CO/FDOT@FDOT, David Sadler/CO/FDOT@FDOT, Duane F Brautigam/CO/FDOT@FDOT, Shirley Harvey/CO/FDOT@FDOT, Steve I Plotkin/CO/FDOT@FDOT
Subject: Re: D3500000 and D3520000

I think 355 is ready for FHWA to review. I would like to be sure that 350 352, and 353 all tie together and that we didn't miss something. ---- Mike

.....

Michael Bergin
State Structural Material Engineer
Florida Department of Transportation
State Materials Office
Gainesville, Florida 32609
(352) 955-6666
SC 625-6666
FAX (352) 955-6680
michael.bergin@dot.state.fl.us
John H Owens

John H Owens
07/14/2003 10:41 AM

To: Michael Bergin/SM/FDOT@FDOT
cc: Charles A Ishee/SM/FDOT@FDOT, Clinton Shaw/CO/FDOT@FDOT, David Sadler/CO/FDOT@FDOT, Duane F Brautigam/CO/FDOT@FDOT, Shirley Harvey/CO/FDOT@FDOT, Steve I Plotkin/CO/FDOT@FDOT
Subject: Re: D3500000 and D3520000

Good morning Mike, are you saying to hold Section 353 and 355, until Sections 350 and 352 are ready to go to FHWA?

Thank You, Have A Great Day,

John H. Owens
F.D.O.T. Specifications Office
(850) 414-4113 Fax (850) 413-7385
E-Mail: john.owens@dot.state.fl.us

Michael Bergin

Michael Bergin
07/14/2003 10:28 AM

To: Duane F Brautigam/CO/FDOT@FDOT
cc: Charles A Ishee/SM/FDOT@FDOT, Clinton Shaw/CO/FDOT@FDOT, David Sadler/CO/FDOT@FDOT, John H Owens/CO/FDOT@FDOT, Shirley Harvey/CO/FDOT@FDOT, Steve I Plotkin/CO/FDOT@FDOT
Subject: Re: D3500000 and D3520000

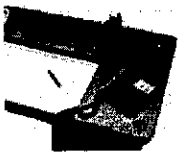
Duane:

Unless the Construction Office has a need to get this into the contracts, I would prefer to get the opportunity to look at these one last time. We kind of put this together at the last minute and I'm not sure that we have 350, 352, 353, and 355 tied together the way that we want them.

----- Mike

.....

Michael Bergin
State Structural Material Engineer
Florida Department of Transportation
State Materials Office
Gainesville, Florida 32609
(352) 955-6666
SC 625-6666
FAX (352) 955-6680
michael.bergin@dot.state.fl.us
Duane F Brautigam



Duane F Brautigam
07/14/2003 09:43 AM

To: Clinton Shaw/CO/FDOT@FDOT
cc: Michael Bergin/SM/FDOT@FDOT, Charles A Ishee/SM/FDOT@FDOT, David Sadler/CO/FDOT@FDOT, John H Owens/CO/FDOT@FDOT, Shirley Harvey/CO/FDOT@FDOT, Steve I Plotkin/CO/FDOT@FDOT
Subject: Re: D3500000 and D3520000

Clinton - After having discussed this with you, I think these changes are substantial enough that they should go back through Industry Review for another round, as you recommended in the FTBA meeting.

The priority specs for upper management are the 338 and 355 Value Added specs. Although the 350 and 352 specs are indirectly related, they are not a show stopper, per my understanding.

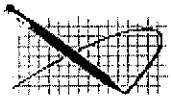
Is the 353 spec directly related to the 350 and 352 specs, or is it a stand alone change?

Ananth/Dave - As I understand Clinton, you are in basic agreement that these deserve a second Industry Review, and are not a must to implement 338 and 355, correct? Please advise.

Mike/Charles - Can you live with delaying implementation to allow a second Industry Review? Please advise.

Thanks - DFB

Duane F. Brautigam, P.E.
State Specifications Engineer
Florida Department of Transportation
(850) 414-4130; SC 994-4130
duane.brautigam@dot.state.fl.us
Clinton Shaw



Clinton Shaw
07/10/2003 03:33 PM

To: Duane F Brautigam/CO/FDOT@FDOT
cc:
Subject: D3500000 and D3520000

Hey Chief,

D3500000 - Cement Concrete Pavement and D3520000 - Grinding Concrete Pavement.

Mr Ishee has been in direct contact with FHWA even before our FHWA submittal. Changes that were made to the Industry reviewed version, I believe, are extensive enough to warrant another Industry review. These changes were generated from FHWA comments.

The problem is, if I remember correctly, these changes 350, 352 and 353 are hot ticket items with the 5th floor and need to be in the January workbook.

Please take a look and let me know.

Reply to Spec 350 with FHWA Comments

Reply to Spec 352 with FHWA Comments

Thanks

Clinton J. Shaw
(850) 414-4129 SC 994-4129
Clinton.Shaw@dot.state.fl.us

Charles A Ishee

07/09/2003 12:55 AM

To: Greg.Schiess@fhwa.dot.gov
cc: Clinton Shaw/CO/FDOT@FDOT, John H Owens/CO/FDOT@FDOT, Shirley Harvey/CO/FDOT@FDOT, Michael Bergin/SM/FDOT@FDOT, David Sadler/CO/FDOT@FDOT, David Y Wang/CO/FDOT@FDOT
Subject: Comments from industry review of 350, 352, and 353

Mr. Scheiss:

Here are the changes that we talked about the other day. I have included five different files and hopefully copied everyone in to help expedite the process to follow. The first three files are the reply to only the comments that I received from the specifications office. The last two files are with the modifications we discussed. What I am sending you is just for informational purposes. If there is going to be a final version, then that must come from the specifications office. Hopefully, this will get everyone on the same page. I have also looked through the rest of the specification book and the other specifications that would have to be reviewed with the changes we discussed are: 180-6.2 and 400-20. If anyone has any questions, please feel free to give me a call at the number below. Thanks....

Reply to Spec 350 Comments.d Reply to Spec 352 Comments.d D3530000.doc

Reply to Spec 350 with FHWA Comments. Reply to Spec 352 with FHWA Comments.

Charles A. Ishee, P.E.
Structural Materials Research Engineer
T: 352-955-6668 (SC 625-6668)
C: 352-339-2376
E: charles.ishee@dot.state.fl.us

Florida Department of Transportation

JEB BUSH
GOVERNOR

State Materials Office
5007 Northeast 39th Avenue
Gainesville, FL 32609

JOSÉ ABREU
SECRETARY

MEMORANDUM

DATE: July 8, 2003

TO: Clinton J. Shaw, State Specifications Office

FROM: Charles A. Ishee, P.E., Structural Materials Research Engineer

COPIES: John Owens, Shirley Harvey, Michael Bergin

SUBJECT: **Proposed Modifications To Specification: D3520000 – Grinding Concrete Pavement**

Comments reviewed, regarding the subject modification to the Standard Specifications, are attached. If you have any questions, please Email me at RT822CI or charles.ishee@dot.state.fl.us.

Attachment

Responses to Comments Received on Draft Specifications

1. **Specification 352-2**
Submitted by: Wayne Bloodworth – Eagle
Comment: I would suggest under section 352-2 EQUIPMENT (replace next to last sentence with the following) "The equipment shall have at least 250 horsepower, a minimum gross weight of 25,000 pounds and be capable of grinding at least 36 inches wide in one pass without causing spalls at cracks, joints or other locations" (or similar wording).
Response: Since this concrete is going to be placed with the 355 specification, the important aspect to the pavement is the ride characteristic that is covered in that specification. This information should be in the Quality Control Plan and not in the specification – No changes needed

2. **Specification 352-2**
Submitted by: Al Weeks – tbegroup
Comment: On an urban curb and gutter concrete pavement replacement and grind project the Contractor utilized this size machines. They could not grind within 6" of the curb and pavement joint even with the machine track running on the gutter concrete. This left the existing pavement marking edge line remain instead of being removed as the E.O.R intended. A smaller machine might be able to get this area.
Response: Agree to an extent - Replace sentence with "The equipment will be of a size that can cut or plane at least 3 feet [1 m] wide or as approved in the Quality Control Plan."

3. **Specification 352-2**
Submitted by: Gerald Cavallaro & Tony Harvey
Comment: IF ONLY ONE SENTENCE IS BEING ADDED TO ONE SUBARTICLE, WHY DELETE AND REPLACE THE WHOLE SECTION? THIS ADDS UNNECESSARY PAPER TO SPEC. PACKAGES.
Response: This is the procedure as defined by the Specification's Office – No changes needed

4. **Specification 353-1**
Submitted by: Nour Nazef
Comment: Capitalize ~~p~~Portland cement because it is a Sir name.
Response: Agree

5. **Specification 352-3**
Submitted by: Nour Nazef
Comment: Change sentence to make it more active voice to "~~Accomplish grinding~~ Grind in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane." Replace "of" in first sentence of fourth paragraph with "for".
Response: Agree

6. **Specification 352-4**
Submitted by: Nour Nazef
Comment: Delete second usage of "pavement surface" in first sentence of third paragraph. Change the word "using" into "with" in the same sentence.
Response: Agree

7. **Specification 352-6**
Submitted by: Greg Schiess – Federal Highway Administration
Comment: Correct table for SI Units to be similar to Non-SI Units table.
Response: Agree

8. **Specification 352**
Submitted by: Greg Schiess – Federal Highway Administration
Comment: Add in Section 14 from Specification 350.
Response: Agree

GRINDING CONCRETE PAVEMENT.
(REV 5-13-03)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind existing ~~portland~~ *Portland* cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least* ~~*three*~~*3 feet [1 m] wide or as approved in the Quality Control Plan.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of existing pavement surfaces designated on the plans. Do not grind bridge decks and roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. ~~Accomplish g~~Grind~~ing~~ in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval ~~of~~*for* a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface

finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

Test the pavement surface for ~~pavement surface~~ smoothness ~~using~~ *with* either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short sections of mainline pavement lanes up to 250 feet [75 m] long, pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test FM 5-558E for a California Type Profilograph (Electronic Model).

The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-5 Surface Corrections

After the curing period, test the surface for pavement surface smoothness in accordance with 352-4(c). Plainly mark all variations from the required tolerances. Where pavement surfaces do not meet the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

Eliminate high spots exceeding 1/8 inch in 10 feet [3.2 mm in 3 m], but not in excess of 0.3 inch in 25 feet [7.6 mm in 7.6 m], by grinding either with an approved machine or with a carborundum brick and water. Do not use bush-hammering or other destructive means for removing irregularities. As directed by the Engineer, retexture corrected high areas to give skid resistance comparable to the surrounding area.

Produce, by grinding, a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Ensure that the peaks of ridges are approximately 1/32 inch [0.8 mm] higher than the bottoms of the grooves with approximately 60 evenly spaced grooves per foot [300 mm].

Operate all milling, cutting, or grinding equipment to produce a reasonably uniform finished surface without spalling the pavement joints within corrected areas. The Engineer will not require extra grinding to eliminate minor depressions in order to provide 100% texturing of the pavement surface. Maintain the cross slope of the pavement as shown in the plans. Repair all joint seals destroyed by grinding at no expense to the Department.

Remove and replace any area of pavement which, after grinding, still shows a deviation in excess of the allowable tolerance. Ensure that the area removed and replaced is the full length between transverse joints and the full width of the lane involved.

Saw the area to be removed to a smooth vertical surface. Clean the face of the adjacent (hardened) concrete, and coat it with an epoxy bonding compound before placing the replacement concrete.

Bear the costs of all surface corrections required and of all required removal and replacement of defective surface concrete.

352-~~5~~6 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-~~6~~7 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	Percent of Pavement Unit Bid Price
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

~~SI Units~~	
~~PI = 80 mm/km~~	~~PI = 110 mm/km~~
~~PI ≤ 30~~	~~PI ≤ 65~~
~~30 < PI ≤ 80~~	~~65 < PI ≤ 110~~
~~PI > 80~~	~~PI > 110~~

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		*Contract Unit Price Adjustments Percent of Pavement Unit Bid Price*
Curvature Radius ≥ 600 m	*300 m ≤ Curvature Radius < 600 m*	
PI ≤ 30	*PI ≤ 65*	*103*
30 < PI ≤ 80	*65 < PI ≤ 110*	*100*
PI > 80	*PI > 110*	*Corrective work required*

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.
Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

Charles A Ishee
06/24/2003 10:19 PM

To: Michael Bergin/SM/FDOT@FDOT
cc: Shirley Harvey/CO/FDOT@FDOT, John H Owens/CO/FDOT@FDOT, Judy F Frazier/CO/FDOT@FDOT
Subject: RE: General Information

Mike:

Well, one issue is easy to solve the other is not so easy. So, lets tackle the easy one first. On the issue of the cores from I-4.... I don't have a preference. As long as we get some from different areas of the project that will be fine with me. I did talk to JR today and he did confirm that this Friday looked like the date to take the cores.

Now, on to the hard issue. Well, remember I told you last week that I talked to Greg Schiese with FHWA on the grinding of concrete pavement. He indicated to me that Tallahassee was in agreement with grinding all concrete pavements. This would affect the revisions to specifications 350, 352, and 353 as well as the new 355. If we change the specification to include all grinding of concrete that is (in my opinion) a MAJOR change that was not put forth for industry review. I also discussed this with Greg Schiese and told him I didn't mind holding these specs until the July 2004 specifications, but indicated that I didn't thing construction would be as willing to wait that long. Greg Schiese said he was going to call and discuss this with Ananth Prasad or Dave Saddler. I have not heard from Greg Schiese, but I did leave a couple of voice mails on his phones and will make sure I talk to him tomorrow to find out what the rest of the story is all about. Until this issue gets resolved, I am sort of in a holding pattern on all three of these specification revisions.

I will be in Jacksonville tomorrow working on the SCC project and will try to get in contact with Greg Schiese. Friday I will be in Lakeland for the I-4 testing and coring. As of right now, I have adjusted my schedule to be in the office Thursday to review all these comments and put together a response. Thanks and when I find out more tomorrow, I will keep you in the loop. Thanks...

Charles A. Ishee, P.E.
Structural Materials Research Engineer
Telephone: 352-337-3254 Cell: 352-339-2376
Email: charles.ishee@dot.state.fl.us
Michael Bergin

Michael Bergin
06/24/2003 02:19 PM

To: Charles A Ishee/SM/FDOT@FDOT
cc:
Subject: RE: General Information

Charles:

I know we have a lot going on this week but we have two additional topics that we need to be aware of;

1. Section 350, 352, and 353 have been sent back to us for our comments that need to be in Tally by close of business Friday. I know you are going to be out of the office on Wed, Thursday and Friday? I will be at the ACI Field Grade 1 Pilot class on Thurs and Fri. Please try to review these specs and give me your comments. I will put all of the comments together sometime Friday before I leave and send them up to John and Shirley.

2. On the issue of the cores being removed from I-4 in District 7, John Barker asked if we had a preference of where the cores should be removed. They would like to have the locations identified

Thursday afternoon so that the coring operation can start first thing Friday morning. If you have a preference for where the cores are removed get a hold of JR. I told John that we were primarily interested in the durability aspects of the concrete and requested that we get 2 cores from any 6 different locations. This will give us a total of 12 cores to perform different testing. If you are in agreement then we're OK, if you would rather do something different call Jim and let him know.

---------- Mike

.....

Michael Bergin
State Structural Material Engineer
Florida Department of Transportation
State Materials Office
Gainesville, Florida 32609
(352) 337-3248
SC 642-3248
FAX (352) 334-1648
michael.bergin@dot.state.fl.us

Shirley Harvey

06/24/2003 07:20 AM

To: Charles A Ishee/SM/FDOT
cc: Michael Bergin/SM/FDOT@FDOT
Subject: Change to Proposed Spec D3520000 - Grinding Concrete Pavement

Nazef.doc

Late comments were received from Abdenour Nazef, would you please look over his suggested changes and let me know if you agree with them or not.

Thanks for your help in this matter,

shirley harvey
SC 994-4120
(850)414-4120
shirley.harvey@dot.state.fl.us

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind existing ~~p~~Portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, riding characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition sufficient equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of existing pavement surfaces designated on the plans. Do not grind bridge decks and roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. ~~Accomplish grinding~~ Grind in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Transition auxiliary or ramp lane grinding as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall roughness within the limits specified, and texture the majority of the pavement surface. The Engineer will not require extra grinding to eliminate minor depressions in order to provide texturing for 100% of the pavement surface, but the Contractor shall ensure that minor depressions are not excessive. Grind sufficiently to avoid having excessive minor depressions. Continue grinding if accumulated total area of minor depressions exceed 30% of the total area of a 0.1 mile [0.1-km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval ~~of~~ for a means to continuously remove grinding residue. Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. However, in rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other open bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Provide a surface finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Produce ground areas that are neat rectangular areas of uniform surface appearance, having a constant lateral offset from the nearest parallel lane line or pavement edge and beginning and ending at lines perpendicular to the pavement centerline.

Test the pavement surface for ~~pavement surface~~ smoothness with ~~by~~ either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph (as specified below). For pavement surfaces not meeting the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. In addition, use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Provide and operate the 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm].

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short sections of mainline pavement lanes up to 250 feet [75 m] long, pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with the straightedge, ensure that the finished pavement profile provides a uniform surface having no deviation greater than 1/8 inch [3 mm]. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] centers, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: a longitudinal profile testing apparatus used to measure a pavement's surface deviations.

b. Profile Trace: a line followed along the pavement's surface by a profile testing apparatus such as a profilograph.

c. Profilogram: a record (printed report) of an individual profile trace, a graphic chart of the measurements of a pavement's surface deviations.

d. Profile Index (PI): .inches per mile [millimeters per kilometers] in excess of the 0.2 inch [5 mm] blanking band (as shown on a profilogram). ~~but is simply called a Profile Index.~~

e. Blanking Band: the 0.2 inch [5 mm] wide scale on a profilogram not considered when calculating a Profile Index.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device as described below.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test for a California Type Profilograph (Electronic Model), Designation: FM 5-558.

The California Profilograph (Electronic Model) is specified due to its ability to perform computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement which is being joined.

Take at least two pavement profile traces. Locate the position of the profiles in the traffic wheel paths. Take the profiles parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review for determining which sections meet or do not meet these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies or provide copies (when the profilograms may be referred to frequently) to the Contractor for his use in correcting section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement so tested meets the following Profile Index requirements and is applicable to the profilogram for each profile trace run:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 7 inches per mile [110 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 9 inches per mile [140 mm/km] or less.

c. In addition to the above Profile Index requirements, paragraphs (1) and (2), ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual high points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the requirements specified.

Do not perform pavement surface smoothness testing with a California Type Profilograph on bridges. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-5 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-6 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
PI = 7 inches/mile	PI = 9 inches/mile	
PI ≤ 3	PI ≤ 5	103
3 <PI ≤ 4	5 <PI ≤ 6	102
4 <PI ≤ 5	6 <PI ≤ 7	101
5 <PI ≤ 6	7 <PI ≤ 8	100
6 <PI ≤ <7	8 <PI ≤ <9	99
PI = 7	PI = 9	98
PI > 7	PI > 9	Corrective work required

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
PI = 110 mm/km	PI = 140 mm/km	
PI ≤ 45	PI ≤ 80	103
45 <PI ≤ 60	80 <PI ≤ 95	102
60 <PI ≤ 80	95 <PI ≤ 110	101
80 <PI ≤ 95	110 <PI ≤ 125	100
95 <PI ≤ < 110	125 <PI ≤ < 140	99
PI = 110	PI = 140	98
PI > 110	PI > 140	Corrective work required

Pay (Price) Adjustments for Incentives/Disincentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the planned thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1-km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.

Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

Shirley Harvey
06/23/2003 08:39 AM

To: Charles A Ishee/SM/FDOT@FDOT
cc: Michael Bergin/SM/FDOT@FDOT
Subject: Comments on Proposed Spec D3520000 - Grinding

D3520000.doc

Please review the above referenced proposed spec and submit any corrections you may have. I would like to have your response back friday (June 27, 2003) so that we can continue with the processing.

If you have any questions please call.

Thanks for your help in this matter,

shirley harvey
SC 994-4120
(850)414-4120
shirley.harvey@dot.state.fl.us

Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JOSÉ ABREU
SECRETARY

MEMORANDUM

DATE: June 23, 2003

TO: Charles Ishee, State Materials Office

FROM: Clinton J. Shaw, State Specifications Office

SUBJECT: **Proposed Modifications To Specification: D3520000 - Grinding**

Comments received, regarding the subject modification to the Standard Specifications, are attached. Please review these comments and advise of any further modifications by June 27, 2003. Also, please submit an electronic summary, of your decisions concerning these comment(s) in memorandum format. This summary will be posted on the State Specifications Office Web Page and included in the Specifications folder for future reference, should someone question your response. Your assistance will be appreciated.

Please Email submittals to SP965CS or clinton.shaw@dot.state.fl.us.

CS/sh

Attachment

GRINDING CONCRETE PAVEMENT.
(REV 5-13-03)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind existing portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least ~~three~~3 feet [1 m] wide.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of existing pavement surfaces designated on the plans. Do not grind bridge decks and roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. Accomplish grinding in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval of a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

Test the pavement surface for pavement surface smoothness using either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short sections of mainline pavement lanes up to 250 feet [75 m] long, pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test FM 5-558E for a California Type Profilograph (Electronic Model).

The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-5 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-6 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work

involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

SI Units	
PI = 80 mm/km	PI = 110 mm/km
PI ≤ 30	PI ≤ 65
30 < PI ≤ 80	65 < PI ≤ 110
PI > 80	PI > 110

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.

Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

Received: 5/29/03 2:05PM; 9049421404 -> FDOT; Page 2
MAY.29.2003 2:01PM FTBA NO.797 P.2/2 p.1
May 29 03 07:43a Andy Clark 352-787-5389
MAY-24-2003 11:30 AM EAGLEGROOVINGGRINDING 7705132862 P.01

EAGLE
GROOVING AND GRINDING CONTRACTORS

May 23, 2003

Mr. Andy Clark
LeWare
Telefax: 352.787.5389

Post-it® Fax Note 7871 | Date 5-29-03 | # of pages ▶
To BOB BURLESON | From ANDY CLARK
Co./Dept. FTMA | Co. LEWARE
Phone # | Phone #
Fax # 1-850-942-5637 | Fax #

RE: Changes to Grinding Specs

D3520000

TO: SPECIFICATION DEVELOPMENT
☐ NO COMMENTS
☒ COMMENTS--PLEASE PROCESS
DATE 05/29/03

Dear Andy,

I appreciate the opportunity to comment on the proposed changes.

With regards to equipment, it is important to remember that the width of the cutting head is only one vital component. Without proper horsepower to drive the head and weight to hold the head into the cut, the width of the head is a negligible factor. Therefore, I would suggest under section 352-2 EQUIPMENT (replace next to last sentence with the following) "The equipment shall have at least 250 horsepower, a minimum gross weight of 25,000 pounds and be capable of grinding at least 36 inches wide in one pass without causing spalls at cracks, joints or other locations"(or similar wording).

We are frequently called in to clean up surfaces where attempts have been made to grind with a machine that is underpowered and too light. Then an excessive amount of pavement must be sacrificed to remove the "carve marks" and achieve the rideability desired.

I hope this information will be of value to those considering changing the specifications. I have some other suggestions for this section of the spec book if the occasion arises. If I can be of further assistance, please call.

Sincerely,

Wayne Bloodworth
President

BOB:
EAGLE'S RESPONSE
D3520000
ANDY

3600 HIGHWAY 317 • SUWANEE, GEORGIA 30024 • 770.271.0588 • FAX 770.573.2092

Duane F Brautigam

05/27/2003 03:29 PM

To: Clinton Shaw/CO/FDOT@FDOT
cc: bburleson@ftba.com
Subject: Data posted to form 1 of http: //www11.myflorida.com/specificationsoffice/IndustryReview.htm

Duane F. Brautigam, P.E.
State Specifications Engineer
Florida Department of Transportation
(850) 414-4130; SC 994-4130
duane.brautigam@dot.state.fl.us
----- Forwarded by Duane F Brautigam/CO/FDOT on 05/27/2003 03:29 PM -----

<webmaster@dot.state.fl.us>

05/27/2003 02:32 PM

To: <duane.brautigam@dot.state.fl.us>
cc:
Subject: Data posted to form 1 of http: //www11.myflorida.com/specificationsoffice/IndustryReview.htm

```
**********************************************************************
**************
File:              D3520000 - Grinding Concrete Pavement
Username:          Al Weeks
UserEmail:         aweeks@tbegroup.com
UserTel:
UserFAX:
ContactRequested:
Remote Name:       24.129.175.131
Remote User:

Comments:

On an urban curb and gutter concrete pavement replacement and
grind
project the Contractor utilized this size machines.  They could
not grind
within 6" of the curb and pavement joint even with the machine
track
running on the gutter concrete.  This left the existing pavement
marking
edge line remain instead of being removed as the E.O.R intended.
A
smaller machine might be able to get this area.
```

Duane F Brautigam

06/12/2003 09:28 AM

To: Clinton Shaw/CO/FDOT@FDOT
cc:
Subject: Data posted to form 1 of http://www11.myflorida.com/specificationsoffice/IndustryReview.htm

Duane F. Brautigam, P.E.
State Specifications Engineer
Florida Department of Transportation
(850) 414-4130; SC 994-4130
duane.brautigam@dot.state.fl.us
----- Forwarded by Duane F Brautigam/CO/FDOT on 06/12/2003 09:28 AM -----

<webmaster@dot.state.fl.us>

06/12/2003 08:35 AM

To: <duane.brautigam@dot.state.fl.us>
cc:
Subject: Data posted to form 1 of http://www11.myflorida.com/specificationsoffice/IndustryReview.htm

```
**************************************************************
**************
File:              D3520000 - Grinding Concrete Pavement
Username:          DONALD DUNCAN
UserEmail:         MT955DD
UserTel:           (850)410-5757
UserFAX:           (850)410-5511
ContactRequested:
Remote Name:       156.75.189.19
Remote User:

Comments:

IF ONLY ONE SENTENCE IS BEING ADDED TO ONE SUBARTICLE, WHY DELETE
AND
REPLACE THE WHOLE SECTION? THIS ADDS UNNECESSARY PAPER TO SPEC.
PACKAGES.
```

Received: 5/29/03 2:05PM; 9049421404 -> FDOT; Page 2
MAY.29.2003 2:01PM FTBA NO.797 P.2/2
May 29 03 07:43a Andy Clark 352 787-5389 p.1
MAY-23-2003 11:30 AM EAGLEGROOVING&GRINDING 7705132862 P.01

EAGLE
GROOVING AND GRINDING CONTRACTORS

Post-it® Fax Note 7671	Date 5-29-03 # of pages ▶ 1
To BOB BURLESON	From ANDY CLARK
Co./Dept. FTMA	Co. LEWARE
Phone #	Phone #
Fax # 1-850-942-5632	Fax #

TO: SPECIFICATION DEVELOPMENT
☐ NO COMMENTS
☒ COMMENTS–PLEASE PROCESS
DATE 05/29/03

D3520000

May 23, 2003

Mr. Andy Clark
LeWare
Telefax: 352.787.5389

RE: Changes to Grinding Specs

Dear Andy,

I appreciate the opportunity to comment on the proposed changes.

With regards to equipment, it is important to remember that the width of the cutting head is only one vital component. Without proper horsepower to drive the head and weight to hold the head into the cut, the width of the head is a negligible factor. Therefore, I would suggest under section 352-2 EQUIPMENT (replace next to last sentence with the following) "The equipment shall have at least 250 horsepower, a minimum gross weight of 25,000 pounds and be capable of grinding at least 36 inches wide in one pass without causing spalls at cracks, joints or other locations"(or similar wording).

We are frequently called in to clean up surfaces where attempts have been made to grind with a machine that is underpowered and too light. Then an excessive amount of pavement must be sacrificed to remove the "carve marks" and achieve the rideability desired.

I hope this information will be of value to those considering changing the specifications. I have some other suggestions for this section of the spec book if the occasion arises. If I can be of further assistance, please call.

Sincerely,

Wayne Bloodworth
President

BOB:
EAGLE'S RESPONSE
D3520000
ANDY

3800 HIGHWAY 317 • SUWANEE, GEORGIA 30024 • 770.271.0586 • FAX 770.513.2082

Posted 5/23/2003

Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JOSÉ ABREU
SECRETARY

MEMORANDUM

DATE: May 23, 2003

TO: Specification Review Distribution List

FROM: Duane F. Brautigam, P.E., State Specifications Engineer

SUBJECT: **PROPOSED SPECIFICATIONS CHANGE – D3520000 – Grinding Concrete Pavement.**

In accordance with Specification Development Procedures, we are sending you a copy of a proposed revision to Section 352 – Grinding Concrete Pavement.

This change was proposed by Charles Ishee, State Materials Office to establish minimum size criteria for the equipment.

Please share this proposal with others within your responsibility. Review comments are due within four weeks and should be sent to Mail Station 75 or to my attention via e-mail at SP965DB or duane.brautigam@dot.state.fl.us. Comments received after June 20, 2003 may not be considered. Your input is encouraged.

DFB/jho

Attachment

COMMENTS: _____

_____

_____

_____

_____

_____

Submitted by: _____ Phone #: _____

GRINDING CONCRETE PAVEMENT.
(REV 5-13-03)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind existing portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least ~~three~~3 feet [1 m] wide.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of existing pavement surfaces designated on the plans. Do not grind bridge decks and roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. Accomplish grinding in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval of a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

Test the pavement surface for pavement surface smoothness using either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short sections of mainline pavement lanes up to 250 feet [75 m] long, pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test FM 5-558E for a California Type Profilograph (Electronic Model).

The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-5 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-6 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

SI Units	
PI = 80 mm/km	PI = 110 mm/km
PI ≤ 30	PI ≤ 65
30 < PI ≤ 80	65 < PI ≤ 110
PI > 80	PI > 110

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.
Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

Shirley Harvey

05/19/2003 02:11 PM

To: bburleson@ftba.com, acarlisle@ftba.com, David Sadler/CO/FDOT, Brian A Blanchard/CO/FDOT, William N Nickas/CO/FDOT, Bruce Dietrich/CO/FDOT, Phillip G Davis/CO/FDOT, Clay McGonagill/CO/FDOT
cc: Charles A Ishee/SM/FDOT@FDOT
Subject: Proposed Spec D3520000 - Grinding Concrete Pavement

D3520000.doc

Please delete the previous e-mail sent to you for the attached document, it had the wrong spec attached, sorry.

Please review the attached document and submit any comment.

Thanks,
shirley harvey
SC 994-4120
(850)414-4120
shirley.harvey@dot.state.fl.us

Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JOSE ABREU
SECRETARY

MEMORANDUM

DATE: May 19, 2003

TO: Bob Burleson, FTBA, David Sadler, State Construction Office, Brian Blanchard, State Roadway Design Office, William N. Nickas, State Structures Design Office, Bruce Dietrich, State Pavement Management Office, Greg Davis, State Estimates Office, Clay McGonagill, General Counsel's Office

FROM: Clinton J. Shaw, State Specifications Office

SUBJECT: **Proposed Specification: D3520000 – Grinding Concrete Pavement**

Attached for your review and comments is a copy of the subject Special Provision for Grinding Concrete Pavement.

This change was proposed by Charles Ishee to establish minimum size criteria for the equipment.

Please review and offer your comments.

CS/sh
Attachment

GRINDING CONCRETE PAVEMENT.
(REV 5-13-03)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind existing portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least ~~three~~3 feet [1 m] wide.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of existing pavement surfaces designated on the plans. Do not grind bridge decks and roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. Accomplish grinding in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval of a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

Test the pavement surface for pavement surface smoothness using either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short sections of mainline pavement lanes up to 250 feet [75 m] long, pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test FM 5-558E for a California Type Profilograph (Electronic Model).

The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-5 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-6 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work

involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

SI Units	
PI = 80 mm/km	PI = 110 mm/km
PI ≤ 30	PI ≤ 65
30 < PI ≤ 80	65 < PI ≤ 110
PI > 80	PI > 110

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.
Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

Charles A Ishee
05/18/2003 11:07 AM

To: Shirley Harvey/CO/FDOT@FDOT
cc:
Subject: Re: Proposed Spec D3520000- Grinding Concrete Pavement

Shirley:

The file looks great to me. Thanks you so much....

Charles A. Ishee, P.E.
Structural Materials Research Engineer
Telephone: 352-337-3254 Cell: 352-339-2376
Email: charles.ishee@dot.state.fl.us
Shirley Harvey

Shirley Harvey
05/14/2003 07:54 AM

To: Charles A Ishee/SM/FDOT@FDOT
cc:
Subject: Proposed Spec D3520000- Grinding Concrete Pavement

D3520000.doc

Please review the attached and submit comments as needed.

Charles, please be sure to check the table under 352-6, the copy that you submitted is different than what was in July 2003 files (which is the one that I am using). If you have any questions please call.

Thanks,
shirley harvey
SC 994-4120
(850)414-4120
shirley.harvey@dot.state.fl.us

Shirley Harvey
05/14/2003 07:54 AM

To: Charles A Ishee/SM/FDOT@FDOT
cc:
Subject: Proposed Spec D3520000- Grinding Concrete Pavement

D3520000.doc

Please review the attached and submit comments as needed.

Charles, please be sure to check the table under 352-6, the copy that you submitted is different than what was in July 2003 files (which is the one that I am using). If you have any questions please call.

Thanks,
shirley harvey
SC 994-4120
(850)414-4120
shirley.harvey@dot.state.fl.us

Florida Department of Transportation

JEB BUSH
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JOSÉ ABREU
SECRETARY

MEMORANDUM

DATE: May 14, 2003

TO: Charles Ishee, State Materials Office

FROM: Clinton J. Shaw, State Specifications Office

SUBJECT: **Proposed Specification: D3520000 – Grinding Concrete Pavement**

Your proposed specification has been formatted and entered for processing. As the originator for this specification, please review the formatted draft and make any necessary changes.

Additionally, please verify the condition under which this specification is to be used (see usage note under specification number).

If you have any questions, please contact Clinton Shaw at (850) 414-4110 or Suncom 994-4110. Your response within two weeks will be appreciated, as further processing is dependent upon your response. We will continue to update you as we process this request for implementation.

CS/sh
Attachment

GRINDING CONCRETE PAVEMENT.
(REV 5-13-03)

SECTION 352 (Pages 322-326) is deleted and the following substituted:

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind existing portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, ride characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition all necessary equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least ~~three~~3 feet [1 m] wide.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of existing pavement surfaces designated on the plans. Do not grind bridge decks and roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. Accomplish grinding in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Grind transition, auxiliary or ramp lane as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall smoothness within the limits specified, and texture over the majority of the pavement surface. Contractor shall ensure that minor depressions are not excessive. Grind to avoid having excessive minor depressions. Continue grinding if accumulated total areas of minor depressions exceed 30% of the total area of a 0.1 mile [0.1 km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval of a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. In rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge with a corduroy type appearance. Provide a surface finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Grind to produce areas of uniform and neat surface appearance for the full width of the travel lane(s) being corrected, beginning and ending at lines perpendicular to the pavement centerline.

Test the pavement surface for pavement surface smoothness using either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph. For pavement surfaces not meeting the smoothness requirements, provide corrective work and retesting to ensure conformity approved by the Engineer.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. Use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Furnish and operate a 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm] in 10 foot length.

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short sections of mainline pavement lanes up to 250 feet [75 m] long, pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide and operate a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with a straightedge, ensure that the finished pavement profile provides a uniform surface with no deviation greater than 1/8 inch [3 mm] in a 10 foot length. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] transversal spacing, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: A longitudinal profile testing apparatus used to measure a pavement's surface profile deviations.

b. Profile Trace or Profilogram: A surface profile record generated along the individual wheel paths using a profilograph. Such a record is analyzed to determine the rate of roughness (or smoothness) and to identify changes in the longitudinal pavement surface elevation that exceed a specified threshold along the pavement length traversed by the profilograph.

c. Profile Index (PI): A profile measurement is a series of numbers representing elevation relative to a specified reference. A Profile Index (PI) is a summary value calculated from these numbers above and below a blanking band over a specified length of pavement.

d. Blanking Band: A band of 0.2 inch [5 mm] uniform height with its longitudinal center positioned optimally between the highs and the lows of the profilogram depicting at least 100 ft (30 m) of pavement.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test FM 5-558E for a California Type Profilograph (Electronic Model).

The electronic model of a California Type Profilograph performs computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement, which is being joined.

Take at least two pavement profile traces with bump option turned on. Locate the position of the profiles in the traffic wheel paths. Take the profiles in the direction of the traffic and parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review to determine the pavement section in compliance with these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies to the Contractor for use to correct section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement tested meets the Profile Index requirements and is applicable to the profilogram for each profile trace:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 5 inches per mile [80 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 7 inches per mile [110 mm/km] or less.

c. Ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less pavement length, until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the specified requirements.

Surface smoothness tests with a California Type Profilograph on bridges are specified in 400-15. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-5 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-6 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work

involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
Curvature Radius ≥2,000 ft	1,000 ft ≤ Curvature Radius < 2000 ft	
PI ≤ 2	PI ≤ 4	103
2 < PI ≤ 5	4 < PI ≤7	100
PI > 5	PI > 7	Corrective work required

SI Units	
PI = 80 mm/km	PI = 110 mm/km
PI ≤ 30	PI ≤ 65
30 < PI ≤ 80	65 < PI ≤ 110
PI > 80	PI > 110

Pay (Price) Adjustments for Incentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the plan thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1 km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.

Item No. 2352- 70- Grinding Concrete Pavement - per square meter.

ORIGINATION FORM

THE INFORMATION BELOW IS TO BE PROVIDED BY THE ORIGINATOR
(The person who receives or originates the issue and needs to forward the issue for action.)

■ Modify Specification _____D3520000_____.
Section/File number

☐ New Section _____.
Section number

Subject: Grinding Concrete Pavement

Origination date: April 24, 2003

Originator: Charles A. Ishee
Office/Phone: State Materials Office/ 352-337-3254
Email address/ Userid: charles.ishee@dot.state.fl.us

Problem statement: A better visual appearance would be produced, by requiring equipment that can produce work that is at least three feet wide, in the concrete pavement grinding operation.

Information source: Information for this section was provided from Pavement Evaluation, Concrete Field Operations and Physical Laboratory at the State Materials Office. State Construction Office provided additional information.

Background data: With the Department's move toward having the Contractor ensure a higher level of materials and quality of control on those materials, many specifications have be updated in recent years to meet this requirement. This Section is being updated to meet those requirements to get a better quality control of materials on Department projects.

Desired implementation date: Beginning with the January 2004 letting.

SPECIFICATION PROCESSING AND STATUS FORM

Begin date: May 13, 2003

File Number: D3520000

Projected completion date: August 12, 2003

Implementation team member: Shirley Harvey.

Schedule of activities: Internal, Industry and FHWA reviews.

Resource needs: None identified at this time.

Implementation schedule: Beginning with the January 2004 letting.

Proposed solution: Establish minimum size criteria for the equipment.

Recommended Usage Note: 352-70 2352-70

Progress report: What is the current status of the issue? Detail problems encountered, that hinders the process.

SECTION 352
GRINDING CONCRETE PAVEMENT

352-1 Description.

Grind existing portland cement concrete pavement to substantially eliminate joint faulting and to restore proper drainage, riding characteristics, and skid resistance to the pavement surface.

352-2 Equipment.

Provide a power driven self-propelled machine that is specifically designed to grind portland cement concrete pavement with diamond-impregnated grinding blades. Provide, operate, and maintain in working condition sufficient equipment to ensure performance of the work in the allotted time. Use equipment of the size, shape, and dimensions that does not restrict the movement of traffic in areas outside the designated limits of construction. *The equipment will be of a size that can cut or plane at least three feet wide.* Use equipment that is capable of grinding specified surfaces without causing spalls at cracks, joints, or other locations.

352-3 Construction Methods.

Grind the areas of existing pavement surfaces designated on the plans. Do not grind bridge decks and roadway shoulders unless indicated on the plans or required to promote drainage.

Schedule and proceed with the construction operation in a manner that produces a uniform finished surface. Accomplish grinding in a manner that eliminates joint or crack faults while providing positive lateral drainage by maintaining a constant cross-slope between grinding extremities in each lane. Transition auxiliary or ramp lane grinding as required from the mainline edge to provide positive drainage and an acceptable riding surface.

Grind the entire area designated by the plans parallel to the centerline until the pavement surfaces of adjacent sides of transverse joints and cracks are in the same plane. Grind the concrete pavement to eliminate the faulting at joints and cracks, maintain the overall roughness within the limits specified, and texture the majority of the pavement surface. The Engineer will not require extra grinding to eliminate minor depressions in order to provide texturing for 100% of the pavement surface, but the Contractor shall ensure that minor depressions are not excessive. Grind sufficiently to avoid having excessive minor depressions. Continue grinding if accumulated total area of minor depressions exceed 30% of the total area of a 0.1 mile [0.1-km] section or if directed by the Engineer. Maintain the cross slope of the pavement as shown in the plans.

Establish and obtain the Engineer's approval of a means to continuously remove grinding residue.

Remove solid residue from pavement surfaces before traffic action or wind blows such residue. Do not allow residue to flow across lanes or shoulders used by public traffic or into gutters or other drainage facilities. However, in rural construction, the Contractor may disperse residue onto the adjacent grassed slopes where the residue runoff can percolate into the soil. Do not allow the discharge of any residue runoff into adjacent rivers, streams, lakes, ponds, or other open bodies of water.

352-4 Final Surface Finish.

Use a grinding process that produces a pavement surface that is true to grade and uniform in appearance with a longitudinal line type texture. Provide a line type texture that contains parallel longitudinal corrugations that present a narrow ridge corduroy type appearance. Provide a surface finish with the peaks of the ridges approximately 1/32 inch [1 mm] higher than the bottoms of the grooves and with approximately 60 evenly spaced grooves per foot [200 per meter].

Produce ground areas that are neat rectangular areas of uniform surface appearance having a constant lateral offset from the nearest parallel lane line or pavement edge and beginning and ending at lines perpendicular to the pavement centerline.

Test the pavement surface for pavement surface smoothness by either a 10 foot [3.048 m] long straightedge, a 10 foot [3.048 m] long rolling straightedge, or a California Type Profilograph (as specified below). For pavement surfaces not meeting the smoothness requirements, the Engineer will require corrective work and retesting to ensure conformity.

(a) Testing with a 10 foot [3.048 m] straightedge: Use this straightedge for longitudinal profiling, parallel to centerline, within 15 feet [4.5 m] of a bridge approach or existing pavement which is being joined. In addition, use it for all transverse profiling of cross slopes, approaches, and as otherwise directed with respect to (b) or (c) below.

Provide and operate the 10 foot [3.048 m] straightedge. When cement concrete pavement abuts bridge approaches or pavement not under this Contract, ensure that the longitudinal slope deviations of the finished pavement do not exceed 1/8 inch [3 mm].

Produce transverse slope deviations of the finished pavement that do not exceed 1/8 inch [3 mm] with the straightedge laid in a direction perpendicular to the centerline.

(b) Testing with a 10 foot [3.048 m] rolling straightedge: Use this straightedge for longitudinal profiling of short sections of mainline pavement lanes up to 250 feet [75 m] long, pavements (mainline or non-mainline) on horizontal curves having a centerline radius of curve less than 1,000 feet [300 m] and the pavement within the superelevation transition of such curves, turn lanes, ramps, tapers, and other non-mainline pavements as directed.

Furnish and operate the straightedge. Provide a 10 foot [3.048 m] rolling straightedge of a design acceptable to the Engineer, able to accurately measure surface irregularities exceeding 1/8 inch [3 mm] in a 10 foot [3.048 m] effective length of the straightedge.

When tested with the straightedge, ensure that the finished pavement profile provides a uniform surface having no deviation greater than 1/8 inch [3 mm]. Perform the profiling in lines parallel to the centerline, at not more than 4 foot [1.2 m] centers, and extending across the transverse joints.

The Contractor may confine checking through traffic lanes with the straightedge to joints and obvious irregularities as directed.

(c) Testing With A California Type Profilograph:

1. General: Use the profilograph on all longitudinal profiling of mainline full width pavement lanes longer than 250 feet [75 m] and as otherwise directed.

The following terms are defined:

a. Profilograph: a longitudinal profile testing apparatus used to measure a pavement's surface deviations.

b. Profile Trace: a line followed along the pavement's surface by a profile testing apparatus such as a profilograph.

c. Profilogram: a record (printed report) of an individual profile trace, a graphic chart of the measurements of a pavement's surface deviations.

d. Profile Index (PI): .inches per mile [millimeters per kilometers] in excess of the 0.2 inch [5 mm] blanking band (as shown on a profilogram). but is simply called a Profile Index.

e. Blanking Band: the 0.2 inch [5 mm] wide scale on a profilogram not considered when calculating a Profile Index.

2. Equipment: Furnish, calibrate, and operate a California Type Profilograph device as described below.

Operate the profilograph while the Engineer observes the operations. The Engineer will confirm that the Contractor is in compliance with Florida Method of Test for a California Type Profilograph (Electronic Model), Designation: FM 5-558.

The California Profilograph (Electronic Model) is specified due to its ability to perform computerized data analysis, and is manufactured by Cox and Sons, Inc. of Colfax, California - Model CS 8200 or better.

3. Surface Test: Produce a riding surface having a Profile Index meeting the requirements herein. Start and terminate the profile 15 feet [4.5 m] from each bridge approach or existing pavement which is being joined.

Take at least two pavement profile traces. Locate the position of the profiles in the traffic wheel paths. Take the profiles parallel to and approximately 3 feet [1 m] from the outside edges of each traffic lane. The Contractor may take additional profiles to define the limits of an out-of-tolerance surface variation.

Upon completion of each day's testing, submit the profilograms to the Engineer for review for determining which sections meet or do not meet these requirements. The Engineer will retain those profilograms meeting these requirements. The Engineer will return profilograms with deficiencies or provide copies (when the profilograms may be referred to frequently) to the Contractor for his use in correcting section deficiencies. The Engineer will retain the corrected profilograms, along with the deficient profilograms, for comparison purposes of the circumstances between the two profilograms.

Ensure that pavement so tested meets the following Profile Index requirements and is applicable to the profilogram for each profile trace run:

a. Ensure that pavement on tangent alignment and horizontal curves having a centerline radius of curve 2,000 feet [600 m] or more has a Profile Index of 7 inches per mile [110 mm/km] or less.

b. Ensure that pavement on horizontal curves having a centerline radius of curve 1,000 feet [300 m] or more but less than 2,000 feet [600 m] and pavement within the superelevation transition of such curves has a Profile Index of 9 inches per mile [140 mm/km] or less.

c. In addition to the above Profile Index requirements, paragraphs (1) and (2), ensure that the pavement riding surfaces have all deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] removed.

The Engineer will evaluate the pavement in 0.1 mile [0.1 km] consecutive sections. Grind all areas represented by individual high points having deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m] or less until such points do not exceed 0.3 inch [7.5 mm].

After removing all individual deviations in excess of 0.3 inch [7.5 mm] in 25 feet [7.5 m], perform additional grinding as necessary to reduce the Profile Index to the requirements specified.

Do not perform pavement surface smoothness testing with a California Type Profilograph on bridges. Ensure that the pavement within 15 feet [4.5 m] of a bridge approach (or existing pavement which is being joined) complies with the testing requirements of a 10 foot [3.048 m] straightedge.

Visually inspect transverse joints and random cracks to ensure that the adjacent surfaces are in the same plane. Where misalignment of the planes of the surfaces on adjacent sides of the joints or cracks is in excess of 1/16 inch [1.5 mm], grind the pavement until the surfaces are flush.

352-5 Method of Measurement.

The quantity to be paid for will be the area, in square yards [square meters], completed and accepted.

352-6 Basis of Payment.

Price and payment will be full compensation for all work and materials specified in this Section, including furnishing all labor, materials, tools, equipment, testing, and incidentals and for doing all work involved in grinding the existing surface, removing residue, and cleaning the pavement, including necessary disposal of residue and furnishing any water or air used in cleaning the pavement.

Contract Unit Price adjustments will be made in accordance with the following schedule(s).

Non SI Units		
Average Profile Index (inches/mile) per 0.1 mile Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
PI = 7 inches/mile	PI = 9 inches/mile	
PI ≤ 3	PI ≤ 5	103
3 <PI ≤ 4	5 <PI ≤ 6	102
4 <PI ≤ 5	6 <PI ≤ 7	101
5 <PI ≤ 6	7 <PI ≤ 8	100
6 <PI ≤ 7	8 <PI ≤ 9	99
PI = 7	PI = 9	98
PI > 7	PI > 9	Corrective work required

SI Units		
Average Profile Index (mm/km) per 0.1 km Section		Contract Unit Price Adjustments Percent of Pavement Unit Bid Price
PI = 110 mm/km	PI = 140 mm/km	
PI ≤ 45	PI ≤ 80	103
45 <PI ≤ 60	80 <PI ≤ 95	102
60 <PI ≤ 80	95 <PI ≤ 110	101
80 <PI ≤ 95	110 <PI ≤ 125	100
95 <PI ≤ 110	125 <PI ≤ 140	99
PI = 110	PI = 140	98
PI > 110	PI > 140	Corrective work required

Pay (Price) Adjustments for Incentives/Disincentives will be based on the initial measured average Profile Index, prior to any corrective work.

The Unit Bid Adjusted Price will be computed using the planned thickness of cement concrete pavement. This Unit Bid Price will apply to the total area of the 0.1 mile [0.1-km] section for the lane width represented by the profilograms for the average Profile Index.

Payment will be made under:

Item No. 352- 70- Grinding Concrete Pavement - per square yard.

Item No. 2352- 70- Grinding Concrete Pavement - per square meter.